TECHNOLOGY DEPT

Gas Journal

LIGHT - HEAT - POWER - BY-PRODUCTS

Vol. 246. 97th Year. LONDON, NOVEMBER 21, 1945. Registered as a Newspaper. No. 4305. Price 1/-

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DETROIT

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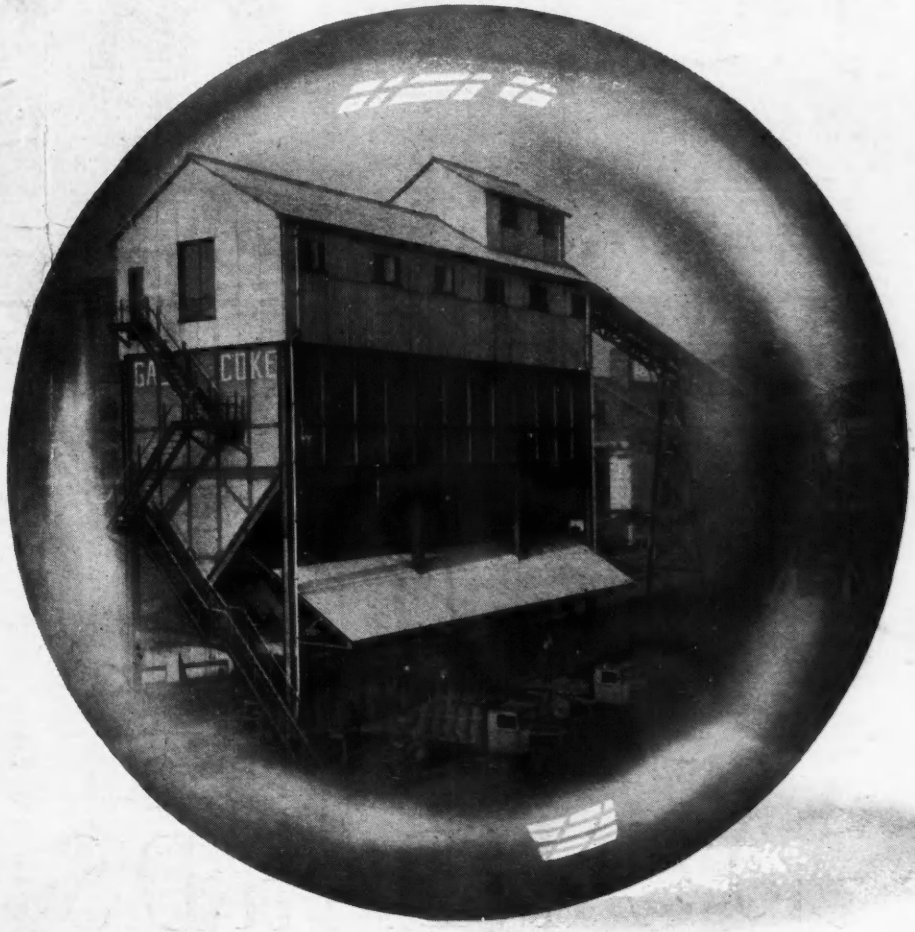
Coke Sales will depend on EFFICIENT HANDLING



THE INDUSTRY WE SERVE
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A preview of reality! This is one of the many individually designed plants for grading coke, evolved by Jenkins to facilitate efficient and speedy handling.

W. J. JENKINS & CO. LTD., RETFORD, NOTTS. Phone: Retford 131
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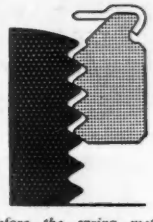
The Standard with the unique finish.

THE STANTON IRONWORKS COMPANY LIMITED NEAR NOTTINGHAM

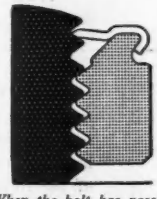
GAS JOURNAL, NOV. 21, 1945
VOL. 246 97th YEAR No. 4305

come rain come shine

THE spring cap of a Pinnacle is unaffected by the weather. It doesn't matter if it rains bucketsful or snows. It doesn't matter if it freezes — or if the thermometer goes up into the hundreds. When you see a Pinnacle on a bolt you know it's locked. The spring metal cap is holding the threads clamped tight. No shaking, no vibration will loosen that nut — nothing, in fact, except a spanner. When we call the Pinnacle a stop nut we mean that it stays put.



Before the spring metal diaphragm comes into contact with the bolt.

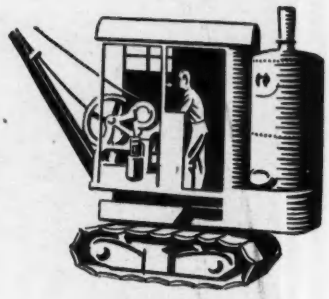


When the bolt has passed through the diaphragm the nut is locked.

PINNACLE STOP NUTS

SIMMONDS AEROCESSORIES LIMITED
GREAT WEST ROAD · LONDON · A COMPANY OF THE SIMMONDS GROUP

The better use of POWER



Where to look for further economies

YOU MAY HAVE DECIDED that you have reached the limit of improvement in efficiency of power usage. But are you sure? Why not make doubly sure by going through these Bulletins *point by point?* If your search reveals only a single possibility it will have been well worth while. The probability is that you will find many.

Turn up these Bulletins:

FUEL ECONOMY BY SAVING ELECTRICITY
(*Bulletin No.* 13)

A rapid survey of the possibilities. Brief, practical pointers that take you straight to sources of substantial economy in electricity consumption.

THE INDUSTRIAL USE OF COMPRESSED AIR
(*Bulletin No.* 29)

Compressed air is a very convenient medium of power transmission. But it can also be a great waster of power unless carefully supervised and maintained. This Bulletin tells you what to look for and how to put it right.

FUEL ECONOMY AT COLLIERIES
(*Bulletin No.* 32)

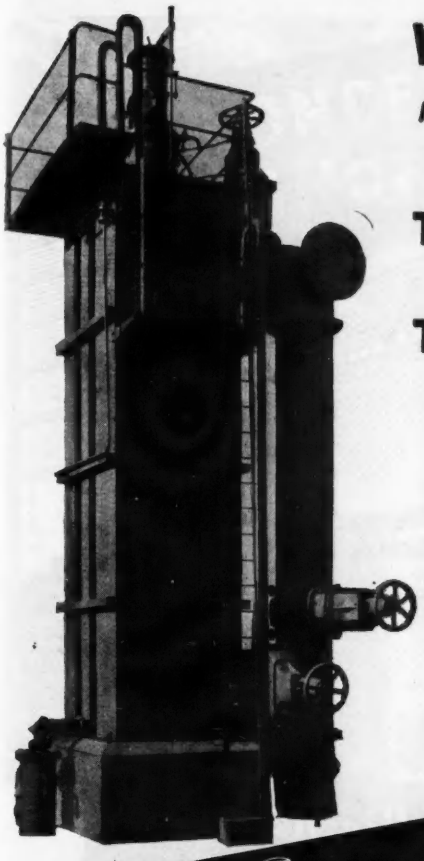
The colliery official will find this Bulletin a real boon. It is a guide to the economical operation of colliery compressed air plant, but it also contains a brief summary of hints on steam boilers, prime movers, fans, pumps and so on.

SMALL VERTICAL BOILERS, STEAM CRANES AND SHUNTING ENGINES (*Bulletin No.* 37)

These power units are often neglected. How fuel losses can be reduced and operation improved is explained in a very practical way.

UNTIL YOU HAVE looked into the possibilities of every recommendation in these Bulletins you ought not to decide that your power is being used efficiently. If you haven't all the Bulletins ready at hand, please ask for the copies you need from the Regional Office of the Ministry of Fuel and Power.

ISSUED BY THE MINISTRY OF FUEL AND POWER

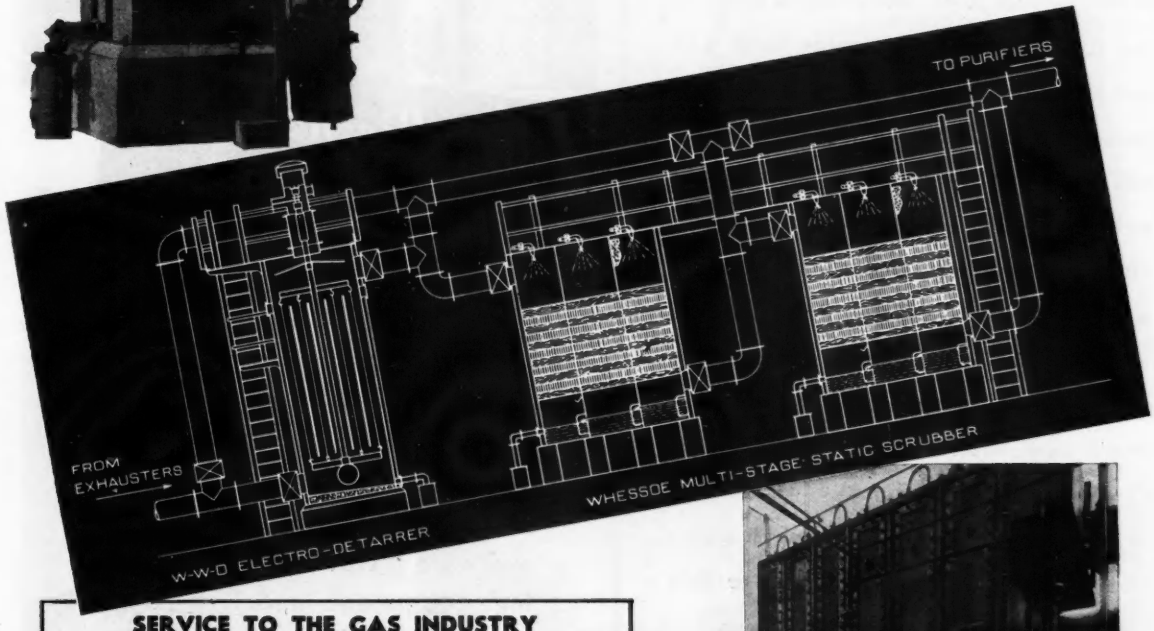


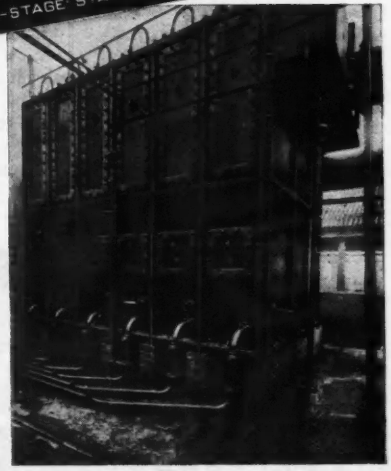
Wet Purification by Whessoe

Modern wet purification practice, involves only two items of plant

THE W.W-D ELECTRO-DETARRER AND THE WHESSOE MULTI-STAGE STATIC SCRUBBER

Combined W.W-D Electro-Detarrer and Whessoe Static. Scrubber wet purification plants are in operation or under construction on gasworks of 5 million, 1 million and 0·5 million cu. ft. of gas per day capacities.





SERVICE TO THE GAS INDUSTRY

The steadfast policy of the Whessoe Company is based on "Service to the Gas Industry."

1. An advisory service to prospective clients provided by technical staff qualified to make recommendations as to the type, arrangement and details of plant and processes.
2. Designers and chemical engineers experienced in the Industry's needs.
3. Works manufacturing facilities greatly enhanced by war production experience.
4. Erection, operating and service staff skilled in their duties.

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FORMERLY THE WHESSOE FOUNDRY AND ENGINEERING COMPANY LTD

RUST PREVENTION

HIGHLY polished steel rollers, shipped from this country, were arriving overseas pitted with rust accumulated on the voyage. All the usual methods of rust prevention were tried, but still rollers arrived damaged and often had to be scrapped.

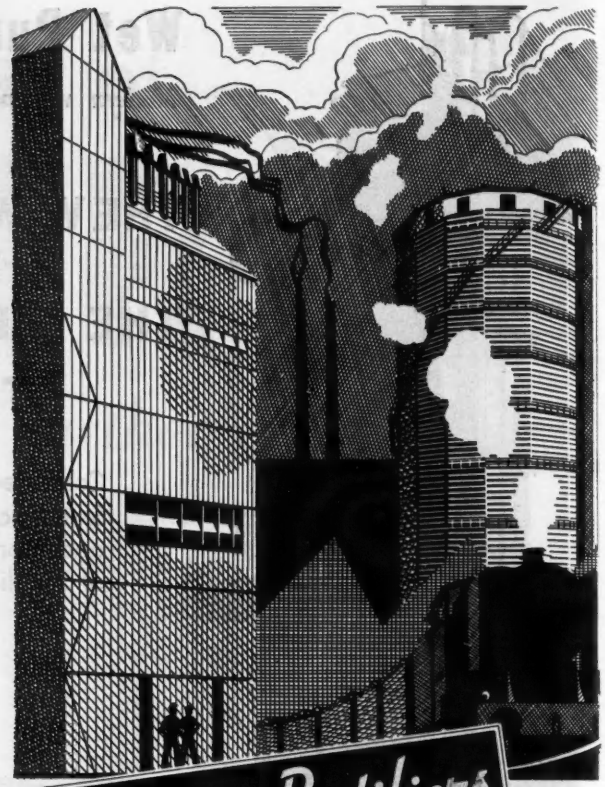
THAT was seven years ago—until DRYNAMELS were called in to investigate. By embodying a special rust inhibiting chemical in a compound designed for easy application we cured the trouble once and for all, and 'LANITOX' (*Regd.*) Compound No. 11 was born.

It is as simple to remove as to apply, but when 'LANITOX' is present on ferrous or light alloys, rust and corrosion are absent.

DRYNAMELS
COVER INDUSTRY

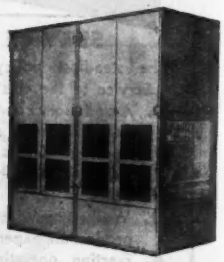
Drynamels Technical Service is freely available to anyone seeking advice on the use, choice and application of Industrial and Protective Finishes

DRYNAMELS LTD. HALL GREEN, BIRMINGHAM 28
Telephone: SPRINGFIELD 1161,2



Hewittic Rectifiers
FOR D.C. SUPPLY IN
GAS & CHEMICAL WORKS

HEWITTIC Rectifiers are the ideal equipment for operating D.C. electrical plant in gas and chemical works, from an A.C. supply. Simple, easily and economically installed in existing buildings and awkward sites; superior to rotating equipment and to other forms of A.C. to D.C. converting plant; operates **completely unattended.**



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Telephones
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CONCERNING CONDENSERS

☆ *Maximum Resistance to Corrosion.*
☆ *Low Maintenance Cost.*
☆ *High Efficiency.*
☆ *Long Life.*

The capital cost of an All-Cast-Iron Condenser is higher than that of an equivalent design with mild steel tubes, but where water corrosion is to be expected, very much longer life of the tubes more than repays the extra prime cost in a short time apart from the elimination of the inconvenience associated with retubing.

Condensers can be designed in Cast Iron for any capacity, to give high cooling efficiency, and can be fitted with thermostatic control if desired, or operated in conjunction with a water Cooling Tower and re-circulation system.

The size and type of Condenser best fitted for any individual duty should be determined from all data available, in order that the highest efficiency in performance and economy can be realised.

We are able to offer a full range of Condenser designs for all capacities covering :—

Horizontal Tubes (Cast Iron or Mild Steel).
Vertical Tubes (Single or Multi-Pass).
The New Super-Vertical.
Atmospheric Types.

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HENRY BALFOUR & CO., LTD. DURIE FOUNDRY · LEVEN · FIFE

LONDON OFFICE: ARTILLERY HOUSE, WESTMINSTER, S.W.1. 'Phone: ABBey 2121

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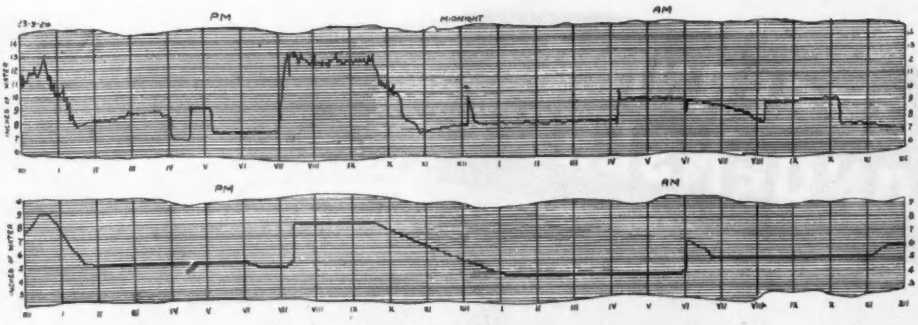


Fig. 29a.

Top Chart: Inlet pressure 5"–36"
Bottom Chart: Outlet pressure 4"–30" w.g.

These charts were recorded by a 36" Peebles (Gas) Pressure-Loaded Governor. Notice how the sharp irregularities so conspicuous on the inlet pressure chart are flattened out on the outlet pressure graph below.

How do these charts compare with your own? If superior, ask for data of Peebles Pressure-Loaded Governor, which gives the closest regulation attained yet.

The main governor is controlled by a small pilot governor having loading weight of only a few ounces—a far more manageable method than the heavy weights used on large weight-loaded governors working on high pressures.

The other advantages of

Peebles ***Pressure-Loaded***
STATION GAS GOVERNORS

are set forth in our latest governor list. Write for a copy.

PEEBLES & CO. LTD., TAY WORKS, BONNINGTON, EDINBURGH

'Phone: LEITH 36544.
'Grams: Tangent, Edinburgh.

PRESSURE-LOADED STATION GOVERNOR

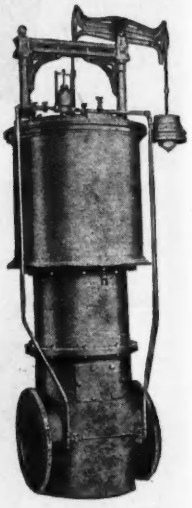
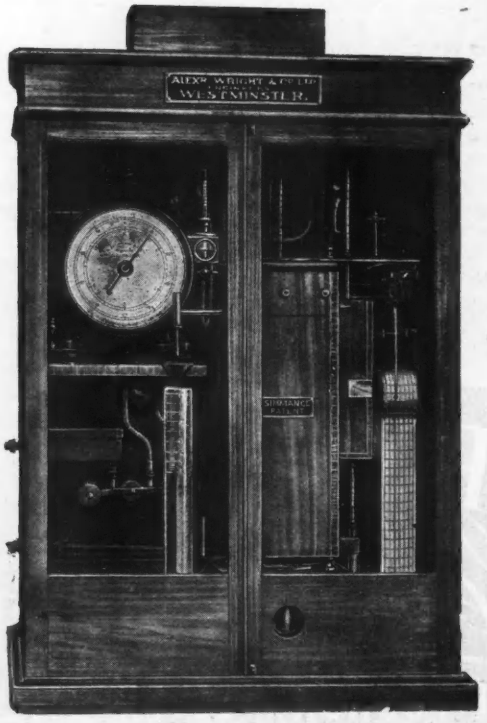


Fig. 29

All sizes available to 48 in. connections; for any conditions of inlet and outlet pressures.



CALORIMETERS
for all Combustible Gases

Simmance Patent

"Positive Record" Gas Calorimeter.

Total Heat non-recording Calorimeter.

Calorgraph (recording Calorimeter).

Indicating Calorimeter.

Portable Calorimeter.

Oil and Gas Calorimeter.

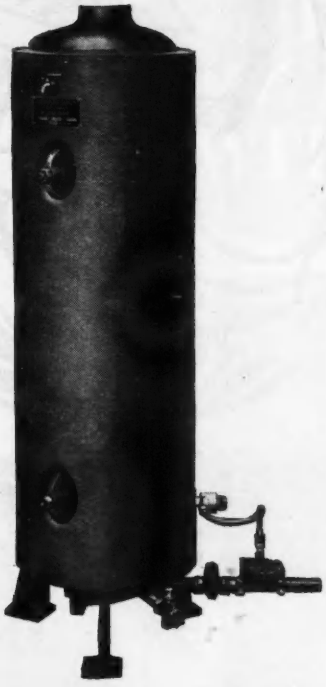
Oil Calorimeter (for light oils and spirit).

Boys' and Junkers' Calorimeters.

ALEXANDER WRIGHT & Co., Ltd.
1, WESTMINSTER PALACE GARDENS
'Phone: ABBey 2207 WESTMINSTER, S.W.1
Works address (for Goods and Empties) 28, High Street, Tooting, S.W.17.

BROCKHOUSE

Gas-Fired WATER HEATERS



TYPE V·H

BROCKHOUSE GAS-FIRED WATER HEATERS, constructed entirely of welded steel are designed to give high thermal efficiency, absolute freedom from fumes or dirt, with minimum space requirements.

The exclusive Brockhouse Automatic Time Control, incorporated with the Automatic Gas Regulator, eliminates stand-by losses and enables the heater to be operated by the most economical methods.

Available in a standard range of sizes from 30,000 to 300,000 B.Th.U., this type of heater is especially recommended for small and medium sized heating installations and for direct hot water systems.

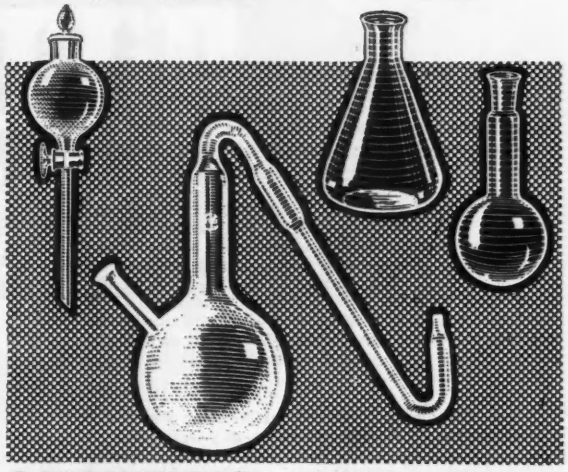
BROCKHOUSE HEATER CO. LTD.
VICTORIA WORKS, WEST BROMWICH
Telephone: WEDNESBURY 0243

LONDON OFFICE:
Morley Hall, 25/26, St. George St., Hanover Square, W.1
Telephone: MAYfair 8783/8

HOLDENS

PYREX

REG^D. TRADE MARK BRAND



SCIENTIFIC GLASSWARE

For Reliability and Service.

IT is essential that all laboratory glassware should possess a degree of stability capable of resisting attacks from acids, while at the same time being immune to the effects of sudden thermal changes.

PYREX Brand Scientific Glassware fully meets every requirement of daily usage in intricate chemical tests. By reason of its amazingly low co-efficient of expansion (·0000032) it is unaffected by either heat or cold. This characteristic permits the structure of this remarkable Glassware to be made of a more robust build than that of ordinary glass, thus giving it substantial enduring strength, which affords protection against breakage in everyday handling.

Chemists and scientists will find that PYREX Brand Scientific Glassware maintains, indefinitely, the many vital and reliable properties essential to modern scientific equipment.

PYREX Brand Scientific Glassware is supplied only through Laboratory Furnishers, but illustrated catalogue and two free copies of our Chemist's Notebook will be sent direct on application to us.

Ask for PYREX Brand and see that you get it!

JAMES A. JOBLING & CO. LTD.
Wear Glass Works,
SUNDERLAND.

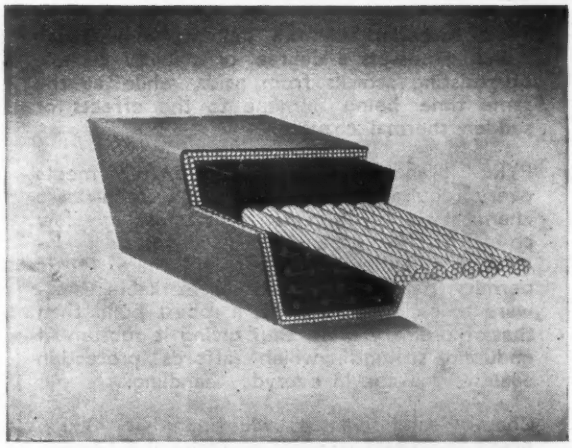
T. 51. A.

HAVE YOU THE RIGHT BELT FOR THE JOB?

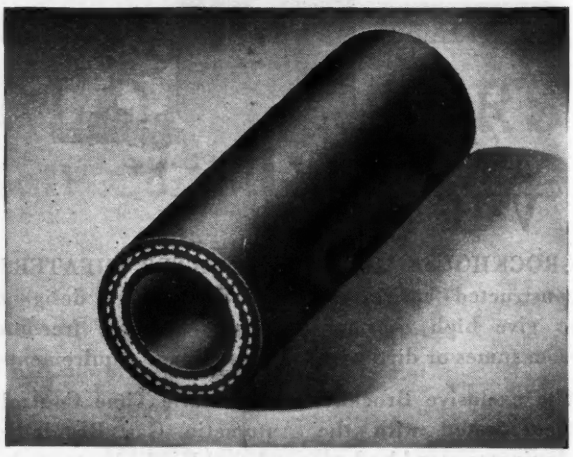
More and more users of industrial rubber products are asking for Goodyear belting or hose, because they find that Goodyear products not only do the job for which they are specified with maximum efficiency — but also give long, reliable, trouble-free service.

The reason is simple. For over a quarter of a century the Goodyear Research Laboratories have been accumulating experience and skill in methods of developing and using industrial rubber. The vast, unique store of knowledge they have built up goes into every hose and belt they make. That's why it is always exactly the right belt for the job. And if you are in any doubt as to which type you should use, let Goodyear specify it for you.

The Goodyear "Industrial Rubber Products Conservation" Handbook is to-day accepted as the standard work on the maintenance of hose and belting. Goodyear will be pleased to send you a copy, and to advise you on any technical problems you may have. Write to the Mechanical Goods Dept. (G.J.), Goodyear, Wolverhampton.



V-Belts. The Goodyear high tensile, low stretch endless cord construction is unsurpassed in flex life and fatigue resistance. Accurate cross section secures perfect grip in sheaves. Matched belts ensure even load distribution, resulting in lower operating costs.



Water (Delivery) Hose. This long-life hose is non-kinking, its high quality tube, cord reinforced, giving strength and flexibility. The outer cover is tough and abrasion-resisting. Manufactured in braid or ply construction.

GOODYEAR

CONVEYOR & TRANSMISSION BELTING • ENDLESS CORD & E.C. "V" BELTS

SUCTION & DELIVERY HOSE

FOSTER

H·R·C
HEAVY INDUSTRIAL
SWITCHGEAR

FOSTER TRANSFORMERS & SWITCHGEAR LTD.

(INCORPORATING FOSTER ENGINEERING COMPANY) SOUTH WIMBLEDON LONDON S.W.19.

Associated Companies: **Lancashire Dynamo & Crypto Ltd., Manchester** ● **Crypton Equipment Ltd., Bridgwater**

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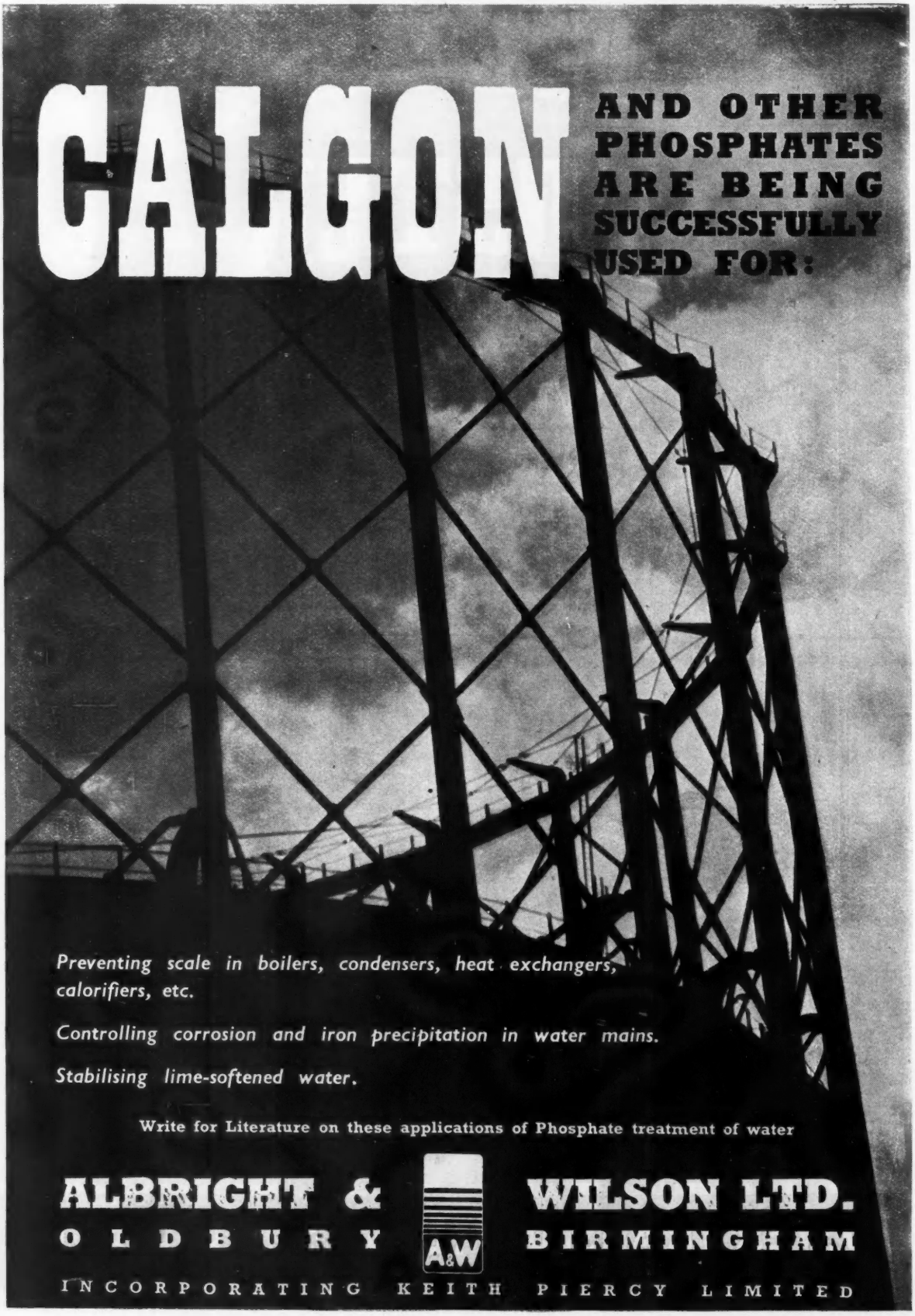

CALGON
AND OTHER PHOSPHATES ARE BEING SUCCESSFULLY USED FOR:
Preventing scale in boilers, condensers, heat exchangers, calorifiers, etc.
Controlling corrosion and iron precipitation in water mains.
Stabilising lime-softened water.
Write for Literature on these applications of Phosphate treatment of water
ALBRIGHT & WILSON LTD.
OLDBURY
A&W
BIRMINGHAM
INCORPORATING KEITH PIERCY LIMITED

DESIGN OF EVERYDAY THINGS IN THE HOME

A COMPETITION FOR YOUTH

£1500

In Prizes

Presented by
W. H. SMITH & SON'S
ADVERTISING
AGENCY

Closing date Mar. 31, 1946

EMPLOYERS
are invited to organize
Staff Entries

"The Shapes of Things to Come"

A competition under the above title has been organized by the Central Institute of Art & Design, The National Gallery, London, at the invitation of W. H. Smith & Son, so that British youth may express to manufacturers their ideas for the design of domestic furniture and equipment. Entries will be judged solely on the merits of the ideas presented. Open to British subjects of either sex, under 30 years of age, including members of H.M. Forces. No entrance fee.

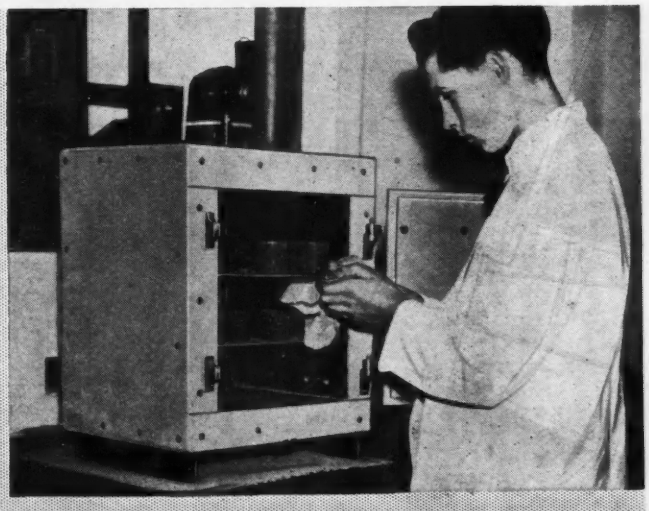
Write, enclosing stamp with addressed envelope, for prospectus and entry form to:

CENTRAL INSTITUTE OF ART AND DESIGN

P.O. Box No. 213, 9 KEAN STREET, LONDON, W.C.2

Quality Controlled

STEEL CASTINGS



THERMOSTATICALLY CONTROLLED CORE DRYING OVEN

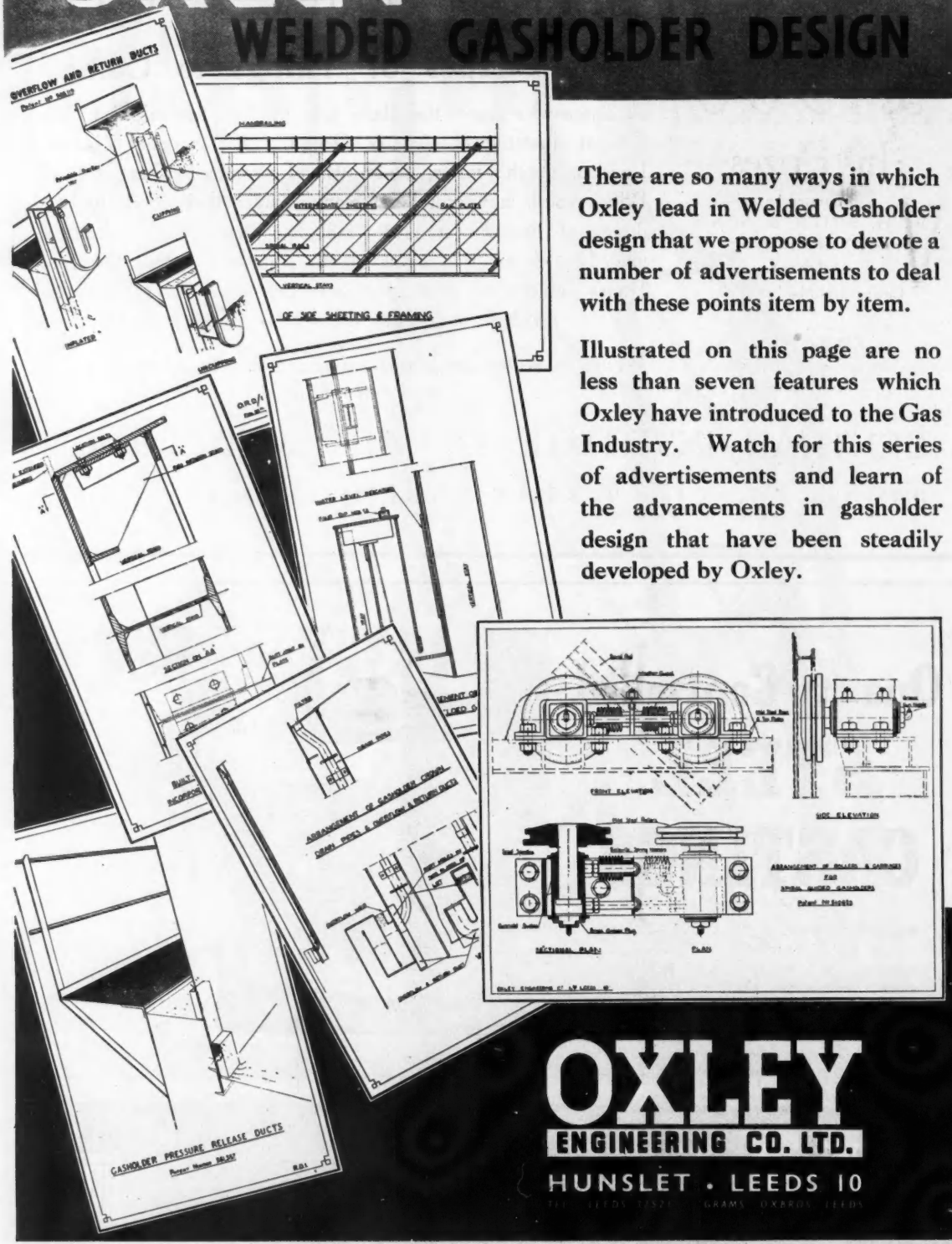
Used in K & L Research Laboratories for drying experimental sand test pieces and cores, this thermostatically controlled oven eliminates any variation in temperature. Rotating shelves and fan circulation enable any desired degree of humidity, air flow or oxidation to be maintained.

K&L STEELFOUNDERS & ENGINEERS LTD LETCHWORTH, HERTS

ONE OF THE 600 GROUP

4510 KF8

OXLEY - *leaders in* WELDED GASHOLDER DESIGN



There are so many ways in which Oxley lead in Welded Gasholder design that we propose to devote a number of advertisements to deal with these points item by item.

Illustrated on this page are no less than seven features which Oxley have introduced to the Gas Industry. Watch for this series of advertisements and learn of the advancements in gasholder design that have been steadily developed by Oxley.

OXLEY
ENGINEERING CO. LTD.
HUNSLET · LEEDS 10

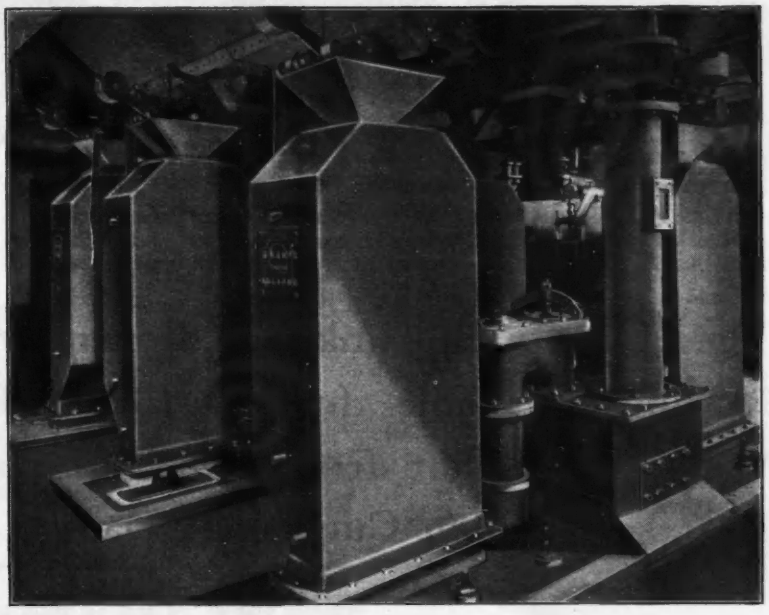
LONDON OFFICE: WINCHESTER HOUSE, OLD BROAD STREET, E.C.2. *Tel.*: London Wall 3731. *'Grams:* "Asbengpro Stock, London."

W.35

"The Era of Reconstruction begins" – H.M. King George VI

RECONSTRUCTION. In his recent address before the House, the King used the term in its widest significance : for everything concerning life and well-being has for nearly six years been of secondary importance in a world where sheer destruction engaged man's fullest enterprise and invention.

DRAKES' own plans for the new period of reconstruction are already in hand. Their own vast contribution to the war effort was not without its useful lessons, and many of these hard-won discoveries will be incorporated in their new peace-time programme, which is dedicated to the service and advancement of the Gas Industry.



View of Coal Feeding Boxes and Gas Offtakes in a Vertical Retort Installation erected by Drakes Limited at Market Harborough.

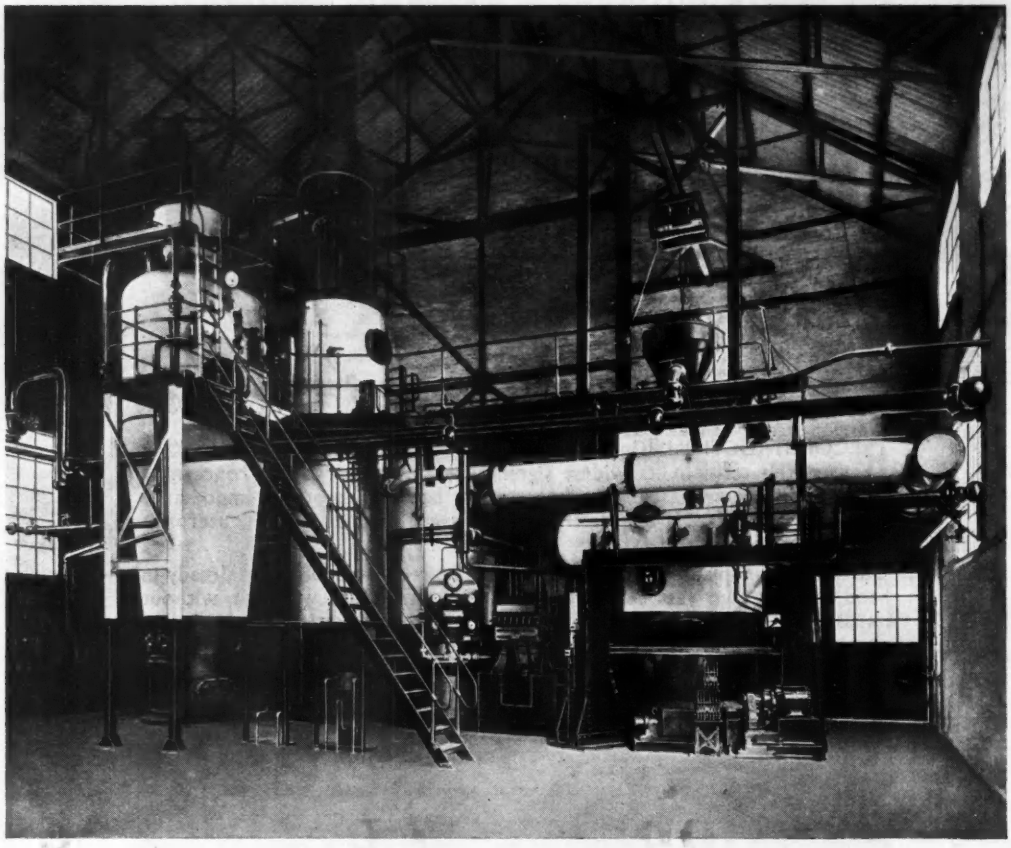
Telephone : Halifax 4701 P.B.Ex.
Telegrams : Draketed, Halifax

Drakes
LIMITED · HALIFAX · YORKS

OLD AS THE INDUSTRY ITSELF

J.J.M.

Humphreys & Glasgow Ltd.



Automatically Operated Self-Clinkering Carburetted Water Gas Plant.
Capacity One Million Cubic Feet per day.

The H & G Self-Clinkering Generator is now available for all sizes of Water Gas Plant from One Million to Ten Million Cubic Feet Daily.

Humglas House,
Carlisle Place,
London, S.W. 1.

H & G

Telephone:
Victoria 3961 (six lines).
Telegrams:
"Humglas, Sowest, London."

Established 1892

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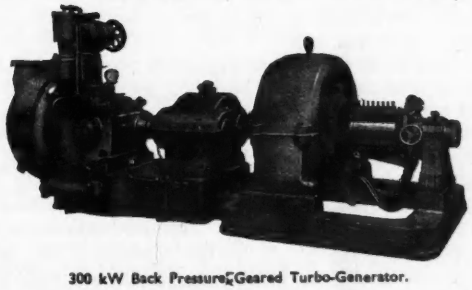

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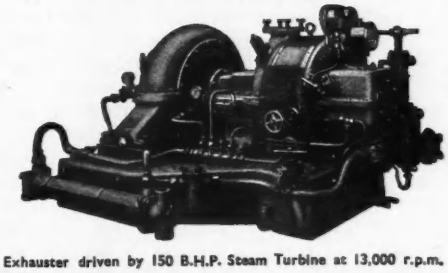

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GAS JOURNAL, NOV. 21, 1945

VOL. 246 97th YEAR No. 4305

EDITORIAL NOTES

SUPPLY OF SMOKELESS FUEL

THE idea that smoke abolition as a national policy is impossible because the necessary smokeless fuel cannot be made available was referred to in these columns last week. It is a view that has found expression not only from the Parliamentary Secretary to the Ministry of Health at a meeting last month, but from many other speakers at that meeting and elsewhere. An answer to the problem has since been put forward by Dr. Foxwell in a Paper presented before a joint meeting of the Institute of Fuel and the National Smoke Abatement Society in Manchester on Wednesday last. This analysis of the position is timely. We understand that the Author, before writing the Paper, consulted the builders of carbonizing plant, the suppliers of anthracite and dry steam coals ("smokeless coals"), and various authorities on domestic fuel appliances and heat utilization in houses and smaller buildings. The result is certainly a composite picture which, though based on a housing policy of perfection, may still be regarded as giving the maximum heat requirements likely to be demanded in our time.

No fuel technologist or gas engineer is likely to quarrel with the principles laid down as governing the supply of smokeless fuel. These are that smoke should be totally (not partially) abolished; that coal should be conserved in the sense that whatever heat is required should be both generated and used in the most efficient manner; and that new and existing houses should be equipped with modern appliances, and in other ways constructed to use heat to the best advantage. It appears from an analysis of the heat requirements as laid down by Egerton and by G. C. Holliday and his co-workers, that modern standards call for nearly twice as much useful heat per household as has been hitherto considered generally necessary. This is not before time, for, unless our memory is at fault, it was the explorer Amundsen who said that not even at the North Pole had he been so cold and uncomfortable as in an English house. We trust, however, that we shall be no less virile and hardy as a nation for keeping warmer indoors. The Spartan nature of our upbringing may have gone no small way to seeing us through the rigours of war without our normal allowance of food and clothing and fuel; that, however, is another story. If we are to allow more useful heat, waste must be eliminated. It is striking to note from Dr. Foxwell's Paper that the reduction of the conductance of the walls of houses from 0.3 to 0.15—a reduction recommended in the *Housing Manual*—can save about half the fuel used for space heating. No doubt it is not only the outer walls of houses that should be insulated, but the walls of each living room as well. Many a domestic breakfast would be more pleasant if the occupants of the room were warm. Insulation of the walls of the room greatly increases the rate of heating-up.

An important point is that a combination of gas and coke gives a lower cost of heat service than gas only. This, of course, has always been fairly apparent, but it emphasizes the point that the Gas Industry cannot afford to become a one-fuel industry until means are found of reducing the cost of gas production. It is an accountancy problem whether gas is expensive because it bears too much of the manufacturing cost, as Mr. Sylvester seemed to suggest at the L.C.C.A. luncheon; it is certain that we must continue to supply a form of cheap smokeless heat in the form of coke so that the advantages of modern heating methods can be available to all. As a public utility this is our duty; provided we get an adequate return from the coke, does it matter greatly whether we sell gas or coke?

The conclusion is reached that with the general adoption of the new highly efficient appliances for burning gas and solid smokeless fuel and with good insulation applied to all houses, the new heat service standards would involve the supply of some 5,100 million "useful" therms per annum. Under present (pre-war housing) conditions the requirement is 3,528 million "useful" therms per annum. Both these are for what may be broadly described as domestic heating and cooking, including hot water supply. "Thus," the Author concludes, "by making use of good constructional methods in housing design, involving thermal insulation to the economic limit, and by installing modern, high-efficiency heating and cooking appliances, the pre-war figure of 1,275 gross therms supplied per household can be reduced to 773 therms per household with nearly twice as much useful heat supplied to the consumer." That is a target at which the country (and the Ministry of Health in particular) must aim. Of this 5,100 million "useful" therms, it is concluded that the existing carbonizing capacity—after supplying metallurgical and industrial needs for gas and coke—can now supply some 1,430 million therms. There is thus a further 3,670 million therms to be found from somewhere. The fact that this is now not available seems to have misled those who deem that the supply of smokeless fuel is the bottle-neck which prevents the adoption of a policy of smoke abolition.

Is there any justification for this view? Dr. Foxwell puts our future capacity for building carbonizing plant of all kinds at 3,000,000 tons of coal carbonized a year, so that the carbonizing industries unaided by the coal industry could, he suggests, completely supply the necessary smokeless fuel for the whole nation inside 10 years. It is very unlikely that the new standards of heating will be generally applied before that time, or that our housing programme will be complete before that time. This, however, is not all that can be done. Given reasonable encouragement, the smokeless coal interests could make 7,000,000 tons of anthracite and steam coals, of a size and quality suited to the domestic market, available within three years, and this could ultimately be increased to 12,000,000 tons. The position is, therefore, that within three years the present output of 1,430 million useful therms could be increased to 3,665 million useful therms. Will sufficient new houses be available within that time to take this fuel?

There is, of course, one important proviso in all this. The Author was careful to add that these estimates depend on labour and materials being made available to the industry as in 1938. With labour stringency, with shortage of refractories and steel, and possibly shortage of drawing office staff, these estimates could not be fulfilled. Is it not possible, however, to regard the supply of fuel and of appliances in which to burn that fuel as part of the housing drive? Informed opinion is solidly in support of a policy of smoke abolition. The carbonizing industries and the smokeless coal industry are ready and willing to implement that policy. It would be a disaster to the cause of clean air if the new houses were to be equipped with smoke-producing appliances. If this problem is tackled on a high level of policy by the Government the problem can be solved. New appliances are being put into production. These appliances are not expensive. There are expensive designs, of course, but a suitable smokeless appliance is not inherently expensive if it is designed for burning smokeless fuel. The high capital cost arises from trying to burn bituminous coal smokelessly. The saving in money and health to this country by clean air would be immense, and would far outweigh any increased capital cost.

CONTROL OF HOUSE FITTINGS

UNDER a comprehensive scheme for the control of house fittings announced last week, gas appliances and other engineering fittings and components for prefabricated houses and for the houses to be built by local authorities are to be ordered in bulk, distributed, and standardized, and their prices and quality are to be controlled by the Government until the end of the present housing emergency. The scheme is to be carried out under powers vested in the new Department of Housing Supplies of the Ministry of Supply, of which Mr. A. A. Saunders is Director-General, in co-operation with the Ministry of Labour and National Service. Some 20 Royal Ordnance factories will be utilized for the manufacture of components, but the bulk will, it is officially announced, be made by private enterprise. The fittings will, in the first place, be supplied to Government and local authority housing schemes, and according to Mr. Saunders it may be possible later to meet small private orders and to place standardized components on the export market, but for some time the private householder who requires fittings for replacement or to a design of his own may have to go short. Mr. J. Wilmot, the Minister of Supply, has given an assurance that the scheme does not mean complete uniformity or the final extinction of individuality. What it does mean is that while the housing shortage remains acute fittings will have a type of priority in peacetime similar to that which munitions had during the war. The Ministry of Fuel and Power has been consulted about the standardization of cookers and other fuel-consuming apparatus, and will approve types which will save fuel and abate smoke. The long list of appliances to come under the scheme includes gas cookers, meters, fires, wash boilers, water heaters, openable stoves, independent solid fuel boilers, refrigerators, and radiators.

In so far as it will expedite the transition from war to peace-time production, the plan is of great interest to manufacturers of gas appliances. After six years of war, in which many of them have made notable contributions to the supply of war equipment, the makers are eager to resume their normal activities, but up to the present they have been handicapped by lack of labour. Given adequate labour and reasonable encouragement to apply the results of their research and development work to full-scale production, they can make a contribution to post-war housing no less valuable than they made to the war effort. The unprecedented demand for appliances calls for mass production, but mass production need not necessarily mean dull uniformity, nor should utility be confused with austerity. The Gas Industry has set a high standard for its appliances, and the manufacturers who have raised them to their present standard are the people to undertake the accelerated production required in the future. The Ministry wants the best appliances; the makers' answer is, "Give us the men and we will finish the job."

Personal

As briefly recorded in the report of the British Gas Council elsewhere in this issue, Mr. J. R. W. ALEXANDER has been appointed General Manager of the Council. Mr. Alexander's connexion with the Gas Industry dates from 1929, when he was appointed Secretary of the Institution of Gas Engineers. He was formerly Parliamentary Secretary of the Society of Incorporated Accountants and Auditors, and brought to bear upon his duties in the Institution a ripe experience of organization and administration. Eight years later he was appointed General Manager of Associated Gas and Water Undertakings, Ltd., from which position he is now resigning on his appointment to the newly created post at Gas Industry House. Throughout the past 16 years he has taken an active part in the wider interests of the Gas Industry, and was responsible for much of the work that went into the Planning Report which the Industry presented to the Minister of Fuel and Power in the autumn of 1943. Educated at Ardingly and Cambridge, where he took second class Honours in the Historical and Law Triposes, he was elected a Governor-Trustee of Fitzwilliam Hall. A pupil of the late Hon. Mr. Justice Fraser, the great authority on the law of Libel and Slander, he was called to the Bar by the Honourable Society of the Inner Temple, and is a Fellow of the Institute of Arbitrators.

* * *

Mr. H. G. RITCHIE, who has retired under the age limit from the position of Engineer and Manager of the Falkirk Gas Department, after 25 years' service, has been presented by the Town Council and officials with a writing bureau as a parting gift. The presentation was made by Provost Strachan, who, along with the heads of the various departments, paid tribute to Mr. Ritchie's work. Mr. Ritchie, who is a past president of the North British Association of Gas Managers, began his career at Kirkcaldy, and thereafter held the position of Engineer and Manager at Fraserburgh and Irvine prior to going to Falkirk.

* * *

Mr. DOUGLAS SCOTT, who prior to the war represented Thomas Glover & Co., Ltd., in the North of England, has just been demobilized and is resuming his duties with the firm. As a serving territorial Mr. Scott was called up for duty with his regiment in August, 1939, proceeding in due course to the East, where he served with the 14th Army, and on attaining the rank of Lieutenant-Colonel commanded a regiment of Royal Indian Artillery.

* * *

Mr. J. DEMAIN is retiring shortly from the position of Engineer and Manager of the Spalding Gas and Water Department, which he has held for 18 years. In future the gas and water undertakings are to be placed under separate management, with an engineer for each.

* * *

Alderman L. F. CHRISTY, who has been Chairman of the Chelmsford Gas Committee for 18 years, has been compelled by reasons of health to relinquish his association with the Town Council. During his chairmanship of the Gas Committee, the annual output has increased from 170 million to 450 million cu.ft.

* * *

Mr. FRANK S. BROWN, of the Coventry Gas Department, has been appointed Showroom Manager to Peterborough Gas Company as from Dec. 1 next.

* * *

Alderman C. G. MARCHANT, Chairman of the Hereford Gas Committee, has been elected Mayor of Hereford.

Obituary

The family of the late Editor and the staff of the "GAS JOURNAL" deeply appreciate the many tributes paid to Mr. Rupert King. All will be acknowledged.

* * *

The death has occurred at Lanark of Mr. J. STEWART, who retired a few months ago from the post of Engineer and Manager of the Lanark Gas Department. Before going to Lanark in 1900 he occupied a similar position at Strathaven. At that time he was employed by the Lanark Gas Consumers' Company, whose undertaking was acquired by the Town Council in 1913.

* * *

The death is announced of Mr. J. BARKER, Engineer and Manager of the Nairn Gas Light Company for the past 41 years. Trained at Leven, he went to Nairn as a young man, and took an active part in the industrial and social life of the town.

* * *

Dr. W. D. JENKINS, Chief Medical Officer to the South Metropolitan and South Suburban Gas Companies, died on Nov. 10, aged 51.

Diary

Nov. 23.—London Juniors: Address by Dr. C. C. Paterson, O.B.E., F.R.S., Gas Industry House, 7 p.m.

Nov. 27-28.—Institution of Gas Engineers: Autumn Research Meeting.

Nov. 27.—Midland Juniors: Visit to the works of the Bryan Donkin Company, Ltd., Chesterfield.

Dec. 5.—Domestic Development Committee: Gas Industry House, 2.15 p.m.

Dec. 6.—Town and Country Planning Association: Lunch-time meeting, 28, King Street, Covent Garden, W.C. 2. Talk and discussion on "Heating the Family Home."

Dec. 7.—North of England Gas Managers' Association (Auxiliary Section), Newcastle, 2.15 p.m.: Address by J. M. A. Mitchell, Newcastle and Gateshead Gas Company.

Dec: 8.—Scottish Junior Gas Association: Joint meeting of Eastern and Western Districts, Glasgow. Address by Dr. Harold Hartley.

Dec. 8.—Yorkshire Junior Gas Association: Demonstration of Flame Propagation by Professor D. T. A. Townend and Dr. J. E. Garside, Leeds University, 2.30 p.m.

Dec. 11.—Midland Junior Gas Association: Paper on "The Treatment of Water for Industrial and Domestic Purposes," C. J. Carter.

Dec. 12.—Institute of Fuel, North-Western Section: "Waste Heat Recovery by Means of Recuperators," G. N. Critchley, Engineers' Club, Manchester, 2.30 p.m.

Dec. 14.—London and Southern District Junior Gas Association: Paper on "Design and Installation of Small Industrial Canteens," D. G. Winslow; Paper on "Bread Baking," A. E. Livett.

§§

British Gas Council

A Meeting of the British Gas Council was held at Gas Industry House on Nov. 14. Mr. A. E. Sylvester, F.C.A., presided.

The resignation was reported of Mr. R. Prince, General Manager and Secretary of the Peterborough Gas Company, and representing the Eastern District. His successor would be appointed at the next meeting of the Eastern Management Committee. It was agreed thal a letter be sent to Mr. Prince on behalf of the Council, thanking him for his services.

The resignation was also reported of Mr. A. G. Williams, General Manager and Secretary of the Wolverhampton Gas Company, and representing the Midland District, his place being taken on the Council by Mr. A. B. Britton.

The following appointments to the Council were reported : Mr. C. Bateman, General Manager, Bath Gas Company (in place of Mr. J. Wesley Whimster), and Mr. K. L. Pearce, Engineer and Manager, Bilston Gas Light and Coke Company (in place of the late Mr. Geo. Dixon).

A report from the Executive Board was made by Mr. Sylvester, Chairman of the Board.

The recommendation of the Board that Mr. J. R. W. Alexander be appointed General Manager of the Council was approved and adopted.

The recommendation that the membership of the Gas Advisory Committee be increased by the addition of the Chairman (Mr. A. E. Sylvester), and Mr. D. Fulton and Mr. A. W. Lee, representing the municipal interests, was approved and adopted.

The Chairman reported that Mr. J. R. W. Alexander, Mr. W. A. Bishop, Mr. R. Prince, and Mr. A. B. Seton had been nominated to serve on the Committee set up by the Institution of Gas Engineers to consider a Post-War Education and Training Scheme for Gas Salesmen.

The Chairman reported that the matter of war damage had been discussed, and that a meeting had taken place that morning between the officials of the Ministry of Fuel and Power and the Council's War Damage Committee, whose report was now awaited. Mr. R. J. Auckland, Chairman of that Committee, stated that the Government now suggested a rough and ready but prompt settlement in respect of each group of public utilities separately. With this object in view a questionnaire had been sent to all undertakings for the purpose of obtaining an estimate of the war damage suffered.

Mr. Auckland outlined the simplified procedure that was now in contemplation, and the matter was remitted to the War Damage Committee.

A deputation from the Conjoint Conference had been received by the Minister of Fuel and Power and a note of the proceedings had been circulated. Mr. Henry Berry, M.P., representing the water interests, had made an opening statement, followed by representatives of the Gas Industry, the outlook for which during the coming winter was most critical, the spokesman being Colonel F. J. Bywater and Mr. F. M. Birks. The electricity interests were represented by Mr. Townley.

The gas spokesman stressed the shortage of coal, shortage of labour, and shortage of plant, and suggested some further relaxation of restrictions and a measure of relief from responsibility if it became necessary to curtail gas supplies.

Speaking for electricity, Mr. Townley based his case largely on the poor quality of the coal now being delivered, giving facts and figures showing the marked deterioration. He also protested against the present method of charging for the coal, emphasizing that whereas house coal had gone up only 59%, the poorer fuels which electricity undertakings had to take had increased by 130%.

The Minister readily acknowledged the co-operation and help which he had received from the utilities, and said he was fully aware of the position in all its phases, and was in agreement with the views expressed by the gas representatives on all save one point, and that was the question of the relaxation of restrictions and relief from responsibility, but even this latter question would be again reviewed.

He thought that stocks would be higher at the end of the year than had been estimated. He emphasized that all possible coal was being diverted from industry. The labour supply could, he said, only be materially increased by speeding up demobilization, and in this regard every possible step was being taken by the Cabinet.

Members were reminded that, at the previous meeting of the Board, it had been agreed that as a temporary measure the Domestic Development Committee should be enlarged and that each District should be asked to nominate a representative. The following nominations had been received from the Districts:

Eastern.—Mr. F. N. Howes, Engineer and Manager, Chelmsford Gas Department.

London.—Mr. W. A. Bishop, Croydon Gas Company.

North-Western.—Mr. S. Hopkinson, Liverpool Gas Company.

Midland.—Mr. A. B. Britton, Engineer and Manager, Hinckley Gas Department.

Northern.—Mr. J. E. White, Newcastle-on-Tyne and Gateshead Gas Company.

Scotland.—Mr. R. D. Keillor, Engineer and Manager, Greenock Gas Department.

Southern.—Mr. A. J. Garward, Portsmouth and Gosport Gas Company.

South Wales.—Mr. R. J. Auckland, Manager and Secretary, Cardiff Gas Light and Coke Company.

South-Western.—Mr. Noel S. Smith, Bristol Gas Company.

Yorkshire (*W.R.*).—Mr. H. Singleton, Engineer and Manager, Huddersfield Gas Department.

The exemption from Purchase Tax was reported in the case of certain domestic appliances as from Oct. 24, including cookers, space and water heaters, stoves and refrigerators.

A report of a meeting of the Benzole Committee held on Oct. 11 was submitted.

It was reported that the annual general meeting of the British Tar Confederation was to be held on Dec. 20.

It was agreed that the five representatives appointed by the Council on the Executive Board of the Confederation under Rule VIII of the Constitution who had served only since the beginning of the year should be reappointed. These were Mr. A. E. Sylvester, Mr. S. Black (Newcastle-on-Tyne), Mr. D. D. Burns (Glasgow), Dr. E. V. Evans, and Mr. A. L. Higham (British Gas Light Company, Hull Station).

The next meeting of the B.G.C. was fixed for Dec. 12, at 2.15 p.m.

Institution of Gas Engineers

The Eleventh Autumn Research Meeting of the Institution of Gas Engineers will, as we have already announced, be held on Tuesday and Wednesday of next week, at the Institution of Mechanical Engineers, Storey's Gate, S.W. 1, commencing at 10 o'clock each forenoon. The Programme will include the presentation and discussion of the following communications:

6th Report of the Chairmen's Technical Committee; 1944–45.

22nd Report of the Gas Education Committee; 1944–45.

1st Report of the District Heating Committee; 1944–45.

Institution Gas Research Fellowship Report; 1944–45. The Mechanism of the Oxidation of Coal (II), by R. E. Jones, B.Sc., (Institution Gas Research Fellow), and D. T. A. Townend, D.Sc., Ph.D., D.I.C., F.R.I.C., Hon.M.Inst.Gas E. (Livesey Professor).

The Removal of Hydrogen Sulphide from Fuel Gases, by G. U. Hopton, B.A., B.Sc., A.M.I.Chem.E., and R. H. Griffith, B.A., D.Phil.

An Experimental Setting of Horizontal Chambers, by R. M. Farror, Assoc.M.I.Mech.E.

Flow States in Burner Streams. (1) Ethylene Streams at Low Reynolds Numbers, by J. E. Garside, Ph.D., and A. B. Whitehead, B.Sc.

6th Annual Report of the Council of the Gas Research Board; 1944–45.

36th Report of the Refractory Materials Joint Committee.

45th Report of the Joint Research Committee of the Gas Research Board and University of Leeds. The Removal of Sulphur Compounds from Coal Gas and Synthesis Gas by A. Key, D.Sc., Ph.D., and A. H. Eastwood, B.Sc., Ph.D.

46th Report of the Joint Research Committee of the Gas Research Board and University of Leeds. First Report on Radiant Heating, by A. L. Roberts, Ph.D., and R. Long, B.Sc.

47th Report of the Joint Research Committee of the Gas Research Board and University of Leeds. A Survey of the Combustion Characteristics of Town Gas, by J. W. Wood, M.Sc.Tech., A.R.I.C.

48th Report of the Joint Research Committee of the Gas Research Board and University of Leeds. A Survey of the Distribution of Organic Sulphur Compounds in Town Gas, by J. W. Wood, M.Sc. Tech., A.R.I.C.

49th Report of the Joint Research Committee of the Gas Research Board and University of Leeds. (*a*) The Synthesis of Methane from Carbon Monoxide and Hydrogen (a detailed account of researches carried out at Leeds during the war years), by F. J. Dent., D.Sc., Ph.D., Joint Assistant Director Gas Research Board.

(*b*) Catalytic Synthesis of Methane (experimental work at the Fuel Research Station), by N. Booth, D.Sc., Ph.D., F.R.I.C. (Research Chemist, Gas Research Board), E. T. Wilkins, M.Sc., Ph.D., L. J. Jolley, B.Sc., Ph.D., A.R.C.S., and J. A. Tabboth, B.Sc., Ph.D., A.R.I.C. (Fuel Research Station, Department of Scientific and Industrial Research).

Scottish Eastern Juniors

The Scottish Junior Gas Association (Eastern District) visited the Leven Works of Messrs. H. Balfour & Co., Ltd., on Nov. 3, the party being conducted round the various departments by members of the firm's staff. The up-to-date nature of the plant at Leven was commented on by many of the members present, considerable interest being shown in the industrial X-ray department and the enamelled metal products department.

The Association was entertained at lunch on the invitation of the Directors of the firm. Mr. Lindsay Burns, Director, addressed the Association after lunch and was thanked by Mr. T. R. Sawers, Vice-President of the Association, for the hospitality extended.

In the afternoon Mr. J. W. Gibson, Carbonizing Engineer to Messrs. Balfour, read a Paper entitled "Modern Methods of Carbonization," and a discussion followed.

Gas and Post-War Housing

At a meeting of the Eastern Counties Gas Engineers' and Managers' Association on Oct. 29, Mr. **G. C. Holliday**, one of the Authors of the I.G.E. Paper, "Technical Aspects of the Gas Industry's Contribution to Post-War Housing," opened a discussion on the Paper.

Col. **J. Kennington** (Grimsby) said it must now be realized that the task of re-housing was to be the responsibility of the local authorities, and that being so the Gas Industry had the right to expect fair play from the local authorities, but he knew that that was not the case in certain instances. Local authorities possessing electricity supply undertakings had not, in some places, given a fair hearing to the case for gas or coke, and he knew of one instance in which the housing committee considered schemes and made a decision without hearing the case for gas, although it had some figures of comparative cost which it was said had been provided by the electrical engineer. Another important matter was the attitude of the Press. When the announcement was made of the withdrawal of the purchase tax on some domestic appliances, two of the big daily national papers gave illustrations of electrical appliances bearing a footnote that these could now be purchased without purchase tax. Clearly, the Gas Industry required more publicity, and in his view insufficient attention had been given to the Paper by Mr. Holliday and his colleagues.

The Water Heating Load

Referring to water heating, he suggested that the high standard mentioned in the Paper of 350 gallons of hot water per week should be taken at the minimum prices. As regards the use of spring taps, he said he considered them a confounded nuisance, as they kept sticking and allowed the water to run for long periods unnecessarily. The combination of coke boiler and gas circulator with a minimum recovery of 10 to 11 gallons of water per hour at 100°F. was ideal, and the electricity supply industry had no counterpart to it. No instantaneous water heater should be manufactured without some form of temperature control, although he believed it was frowned upon by many makers of appliances. In larger installations it was necessary to consider the psychological effect on a person who had been used to a storage system capable of supplying hot water at approximately 4 gallons per minute at the bath tap with a temperature of 140°F. and filling the bath in four minutes and who, when he moved into a new house with an instantaneous water heater, had to be content with a quarter of a gallon per minute at 140°F., and a period of 12 to 15 minutes for the bath to fill.

Ventilation was one of the most pressing problems of the modern house, but very little attention had been given to it in the past. Ventilation must be positive. In the kitchen there should be eight changes of air per hour during the cooking period, and the ideal was to have a flue or ventilating shaft capable of dealing with four changes per hour permanently, and arrange for the additional four changes during cooking by means of a mechanical extractor. Increasing ventilation by means of the window was never satisfactory, as it caused considerable discomfort, and the effects produced depended upon the direction of the wind.

Mr. **Holliday**, in reply, said it did not come within the purview of the Paper to deal with local authority bias, although he was very well aware of it. As to the Paper being widely circulated, large numbers were being sent to the Ministry of Fuel, the Ministry of Works, and the Ministry of Health. As regards water heating, the quantity of 350 gallons of hot water per week mentioned in the Paper was not used in the South. The minimum quantity was not used in the Kensal House flats, and in view of the possible misuse of comparative figures by different industries, the Authors considered it necessary to have the two standards of water heating mentioned in the Paper. He agreed that in the case of the instantaneous heater it would be desirable to have some form of temperature control, and he was glad to be able to say that something was being done in that direction. Without giving away any secrets he could say that appliances so fitted were in course of development. Although there was that psychological effect as regards the speed of delivery of hot water which Col. Kennington had mentioned, it should be emphasized that the Paper dealt with the lower income groups and many of these people had never had a hot water service before.

Speedy Service

The electric immersion heater in the Portal houses was a very poor affair and quite expensive to run, but nobody would really complain; either the apparatus would not be used at all or the tenants would grin and bear it, because they had never had a hot water service before. That was one of the difficulties, but he thought there was a place for the instantaneous heater in houses and flats for the lower income groups because it had the advantage that the tenant obtained what he paid for and knew where he was. There was definitely a field for both instantaneous heaters and storage heaters. The fullest use should also be made of the fact that gas was the speediest fuel. In the case of the Portal houses, the heat input to the hotplates of the gas cookers in those houses was about twice that of the electric cookers, and in the case of water heaters the heat input was one therm per hour—equivalent to 20 kw. of electricity. Therefore, in spite of the fact that there might be slower delivery of water to the bath, gas was giving a service which could not be obtained by electricity.

As regards ventilation, the Paper did not suggest that reliance should be placed upon windows. He agreed that kitchen ventilation was a most important matter, and he believed the Ministry of Works had been convinced on that point, but there was still a difficulty with bedrooms. In the prefabricated permanent houses now being considered it had only been possible as yet to get a flue in the main bedroom. Unfortunately, some of the people who had been to America to investigate these problems had come back with the idea that ventilation did not matter at all, which rather cut across the suggested Codes. In his view there should be positive ventilation in all rooms, and he was still hoping they would get that. He would not like to see mechanical extraction adopted to the exclusion of flues, because their operation depended on the whim of the user. They might not be used, and bad conditions would result. There should certainly be a flue in every kitchen.

Comparative Costs

Mr. **F. Allen** (Clacton-on-Sea), while agreeing that the Paper was a text-book on modern domestic fuel service, said that having regard to changing money values, the Paper would well repay revision at fairly frequent intervals. The fact that prices had not only increased but had altered in relation to one another caused an almost immediate need for alteration in the comparative costs in the Paper. From published figures it appeared that the ordinary selling price of gas in the larger towns of the Eastern Counties had increased approximately 30% above pre-war prices, but the selling price of coke had increased to approximately 70% above pre-war. If these percentages were correct, then the running costs of the examples using the larger proportion of coke suffered somewhat in comparison.

If they took as an example the running costs of Plans 1*a* and 1*e*, the Authors on pre-war figures showed that the gas and coke combination was 2s. 5d. cheaper than the all-gas service; in other words the expenses for all-gas were 42% higher than for gas and coke. Using the percentage increases in cost he had mentioned, the average weekly cost of the gas and coke house became 8s. 6d. per week, while the all-gas house cost 10s. 7d. for an average week. The difference was now 2s. 1d. per week, but the all-gas installation was only 24½% above the gas and coke installation instead of the original 42%. Even taking into account the Chancellor of the Exchequer's April gifts to the lower income groups, he was not sure of the practicability of these prices to the ordinary artisan income, despite the desirability of the better standard of heating envisaged by the Authors.

The points mentioned had been realized, he thought, by the British Commercial Gas Association in preparing an abstract of the Paper. The booklet so prepared provided a valuable means of approach to architects, builders, and local authorities, but it could very properly be followed up by examples of running costs when these became more stabilized. In the original Paper the Authors stated that capital costs were not widely different for any of the systems considered. He did not know if this statement had been omitted by the B.C.G.A., merely in a desire for brevity, but in his experience architects, builders, and local authorities had considered comparisons of capital costs to be of considerable importance.

He agreed with the Authors that the total cost of the service to the user was made up of capital, maintenance, and running cost, but in pre-war building practice the user was the last person who had a say in the matter, and the original capital cost was of paramount importance. In pre-war days it was his experience that this was particularly true of the speculative builder, and judging by articles, reports, and correspondence in the daily Press, maintenance and running cost of fuel service did not even now appear to be regarded as matters of importance by some local housing authorities.

He would like to see some simple form of publicity which really succeeded in reaching the actual users of fuel consuming appliances, made them aware of the comparisons of maintenance and running costs of different types of fuel and appliances; they should be made aware of the fact that as they paid the piper they were entitled to call the tune.

Space Saving

In conclusion he emphasized the revelation in space saving in planned kitchens compared with the more haphazard kitchen of pre-war days. In Clacton as many as 650 houses were built in one pre-war year by private enterprise. These houses mostly differed in design, and if we were to return to this system of building he wondered who was going to plan all the different kitchens if gas or gas and coke-burning appliances were to be fitted into planned kitchens. It seemed to him that to be of practical value and of benefit to themselves and the customers, the Industry must run a kitchen planning section, and this would call for some co-operation between manufacturers of different types of appliances, so that apparatus of standard heights and sizes would be supplied with a view to these being readily incorporated in

suitable kitchen designs. He was aware that this had been done at a Government level in the case of prefabricated houses, but perhaps the Authors had some ideas as to how it could be done at a local level to meet the case of individual house building, if and when such a form of building returned to the realm of practical things.

Capital Costs and Running Costs

Mr. **Holliday** replied that it had only been possible for the prices in the Paper to be taken at pre-war level because no one knew exactly what post-war prices would be. But if anyone did not like Table VII in the original Paper they could use Table III in the shortened version, and from that work out what the costs would be with the present levels of prices for gas and coke. The estimates of capital costs were based on the houses and flats put up at Northolt, and he believed Mrs. Abbott would agree that the capital costs of the installations came out near to one another. Obviously maintenance costs were very important from the consumer's point of view as well as that of the gas undertaking, as were running costs, but although the Housing Manual stressed the importance of running costs as against capital costs, it had been found that the Ministry would turn down a suggestion for an increase of 5s. in the capital cost—because they said that 5s. on 10,000 houses was a large sum—notwithstanding that it would be more than saved in reduced running costs. It was only fair to say, however, that the Ministry were quite aware of this, but the Treasury was behind it all. The point was exemplified in the small additional capital cost by adopting heat insulating material which, while increasing the capital cost, helped considerably to reduce the running cost. It was hoped that something would be done about this heat insulation question.

Kitchen planning was a little outside the scope of the Paper, but the Authors had tried to keep to the fundamental rules of kitchen planning and had provided for appliances with standard dimensions. There was a British Standard specification of cooker units, and as these were likely to be the only ones available for some time, architects might as well try and fit their appliances in to these standard dimensions. In the Portal type of house the cookers had to fit into certain standard dimensions, and they would be available either as built-in cookers or free standing cookers.

Mrs. **Abbott** (Women's Gas Council) expressed the hope that copies of the Paper would be sent to the members of the new Housing Committees. She also asked that there should be more publicity about refrigerators, and added that not enough was being done with regard to the use of gas for the disposal of garbage. Speaking from the woman's point of view, she said that women were getting tired of so many exhibitions and diagrams of planned kitchens and books on the subject of the modern home generally. Women wanted these things now and not in the future, and she gave the warning that the temper of women was rising. They had been shown too many exhibitions and ideal homes of to-morrow, and they were beginning to say they wanted to use the modern cooker and hot-water heater in this world, and therefore she hoped that the carrot would not be dangled before the noses of women much longer.

Real Difficulty

Mr. **Holliday** said that manufacturers were well aware of the shortage of appliances, and added that the Paper did not say these appliances were available. The manufacturers were in a difficulty. They had Government contracts in hand for the prefabricated houses at the moment and, at the same time, were trying to convert from war conditions to peace conditions. Once the change-over had been made he did not think there would be any great delay in getting appliances. He agreed that a proper garbage disposal system was necessary, and that was mostly a problem concerning flats.

Mr. **C. B. Staniforth** (Ely) urged the Gas Industry to recognize the magnitude of the opportunity now afforded to secure the introduction of gas into houses—an opportunity that was far more advantageous than the one offered after the 1914–18 war. After the last war the public was nothing like so gas-minded as it was to-day, and if the Gas Industry regarded the whole problem even in a 1939 attitude it would be making a great mistake. Women were coming out of mechanized factories and the mechanized Forces, and would want a push-button service as far as possible, and therefore use must be made of fuels which gave the greatest relief to housework and the greatest cleanliness all round. He maintained that the market now available to gas had been stimulated by the electrical industry, which, paradoxically, was not in a position properly to cater for it. Again, after the last war the Gas Industry was in no position to cope with a large cooking demand. There was an intimate knowledge of the problem, but inadequate apparatus, and there was insufficient co-ordination among the various sections of the Industry in matters of policy. The position was now very different, and Council surveyors were almost pathetically wanting to co-operate. The Gas Industry should offer them help.

After the last war the price of coal was relatively low and the price of gas relatively high. But during the past six years the price of coal had advanced considerably, whereas the price of gas, thanks to the income from coke, had not advanced very much, and the relative competitive power of gas was now much greater. Altogether he considered the Gas Industry had an unparalleled opportunity for increasing business. One of the first things to be done was to decide nationally the proportion of business it was desired that gas and coke should take. There was a time when coke was looked upon as a poor relative. That was not so to-day. It must now be looked upon as a partner. At the same time it would be a mistake to assume that coke was equal in proportion of value to gas. Two important markets were water heating and mild weather heating in the living room and bedroom. The right place for coke was the living-room fire in the depth of winter.

Business Getters

Then there was the problem of tariffs. The flat rate charge for gas was as dead as the dodo as a business getter although it was in use almost everywhere. There were the block tariff and the two-part tariff, and he preferred the latter because it was infinitely the most flexible. He urged that now was the time to develop a tariff system which would get business. Further, was the Industry satisfied that the advertising on its behalf was sufficient to cope with the large building programme of the Government? Speaking of his experience in Ely, he said that in February the local council decided to erect prefabricated houses. The first he heard of it was in the local papers, and it had been decided to use electricity in the kitchens without consulting him with regard to gas. He protested and asked for an opportunity to put the case for gas. He was given that chance and prepared a document in which he reminded the electrically minded councillors that they also used gas for cooking; only one out of the 15 used electricity. At a subsequent Council meeting the original decision was reversed, partly because the possibility of obtaining prefabricated houses became remote, and partly because of their high price. The Council then decided on permanent houses, and as a result of his previous action he was able to quote for a greater use of gas in the new houses. Whether he would get the business he did not know, but he believed a proportion would come his way. What gas did in the modern houses would set the pace for modernizing old houses, and for that reason alone he urged it was very important to have the tariffs now.

Mrs. **Eileen Murphy** (British Gas Council) said the obvious conclusion to be drawn from the Paper was that a combination of gas and coke was the most economical method to adopt for the lower wage earners. The Authors, however, gave a much higher percentage of gas to coke than had been the case previously, but in that she believed they were right, because anything that would make for greater comfort and cleanliness and reduce the work in the house would be accepted and welcomed by the younger generation. She sometimes thought too much attention was given to running costs, and the great convenience of gas would be regarded as a set-off to slightly higher running costs by most people. It would not be long before gas for water heating and space heating would receive widespread acceptance, and more attention should be given to intermittent heating than to continuous heating, for the reason that the young housewife, who had to do everything for herself, had constantly to be out of the house. She must take her children to school, and she sometimes wanted to go to the cinema, and anything that reduced labour in the house was thoroughly welcomed. Having regard to the increase in basic wages, she maintained that people would prefer to spend a little more money to get labour-saving fuels for all possible purposes.

Mr. **W. T. Hallam** (Bedford) said he had already applied the Authors' suggestion of running a large bore pipe to the bath and a small bore pipe to the sink and wash basin. He urged the Gas Industry to try to get as many coke boilers installed as possible, and generally to give better facilities than had been provided in the past.

Practical Advances

Mr. **H. R. Thomas** (Bury St. Edmunds), remarking on the attention being given, since the end of the war, to building both temporary and permanent houses, said that at Bury St. Edmunds 65 temporary houses of the Tarran and Arcon type were to be erected, and 50 of these would use gas for cooking, wash boilers, and refrigerators. A site for permanent houses was in course of preparation which, when fully developed, would contain working-class dwellings. An early start was to be made on 120 houses, and no time had been lost in placing before the local authorities information regarding the installation of gas- and coke-burning appliances—so far with encouraging results. The best fuel arrangements for the lower income section of the community were to be found in the gas-coke house of the type shown in Plan 1*a* of the Paper. As to the kitchen, a free standing cooker had several advantages over the built-in type, especially where cleanliness was concerned, and he liked to see all gas cookers provided with a rack. The wash boiler should be movable and provided with a wringer. The improvements embodied in the Fulham coke grate, with controlled air supply, made this apparatus so flexible that it was already becoming very popular in many of the better class houses. The importance of installing apparatus for the consumption of smokeless fuel could not be too highly emphasized to those responsible for the design of houses. There was still a strong tendency to install wasteful coal-burning appliances for both cooking and space heating.

A new form of back-to-back range comprising a solid fuel grate in the living room, which could be used open or closed, heating a back boiler for hot water and also an oven in the kitchen, side by side with a gas cooker all in one unit, was, he understood, in course of production, and it seemed to have many advantages for the gas-coke type of house. A saving was claimed in the chimney construction, and warmed air could be supplied by means of ducts to bedrooms above. Finally, he said it was up to the Gas Industry to keep local authorities, architects, and the public generally fully informed on the importance of using gas and coke as the most economical fuels.

Mr. **T. C. Battersby** (Watford), proposing a vote of thanks to Mr. Holliday, said that so far he had not seen any attempt to introduce insulation on an estate of any magnitude. It had only been done in one or two isolated houses where those concerned had given some thought to what happened to the heat after it had been generated. With regard to ventilation in the kitchen by means of a mechanical extractor, a member of his staff had devised, and the Company had installed in a few cases, a fan which was automatically operated by the differential pressure across the gas burner.

Mr. **R. A. Weston** (Norwich), who seconded the vote of thanks, said that for the lower income group it would be necessary to have the gas-coke combination, but he made two pleas. The first was whether the Industry was ready to supply coke suitably graded for coke fires and boilers, because unsuitably graded coke gave it a bad name. In Norwich 200 temporary houses were being installed, and they were each fitted with a coke grate in the living room. He estimated he would be able to get the gas-coke combination in all the new houses in Norwich, but the coke must be suitably graded. The second point was with regard to kitchen planning. He made a plea for the free standing cooker to facilitate cleaning.

Manchester District Association

A Meeting of the Manchester District Association of Gas Engineers was held in the Demonstration Theatre of the Manchester Corporation Gas Department on Oct. 26, when the President, Mr. C. H. Bamber, B.Sc. (Rochdale), extended a hearty welcome to the large number of members and visitors who attended.

The President referred to the death of their esteemed friend, Mr. George Dixon, O.B.E., of Nottingham, who had passed away. Mr. Dixon became a member of the Association in December, 1919, and was its President in 1933. He had been President of the Institution of Gas Engineers in 1940–41. They all felt deeply the loss of Mr. Dixon.

The President then read a list of new members of the Association as follows: Dr. Michael Barash (Manchester), Donald Benson, B.Sc., A.R.I.C., Assistant Gas Engineer and Manager, Bolton Corporation Gas Department; R. W. Crowther, M.I.Mech.E., Technical Director, W. J. Jenkins & Co., Ltd.; W. Ingham, Gas Engineer and Manager, Millom Rural District Council; and F. G. Pyper, First Assistant Chief Engineer, Sheffield and District Gas Company.

Junior Gas Associations

The President said it had been observed by the Examiners that the standard of sketching in the Examination Papers set left much to be desired, and urged that the matter should receive attention. The Yorkshire District Gas Education Committee had put forward a suggestion that there should be a more systematic use of notebooks by students with regard to the various studies upon which they were engaged, and for which it would be necessary to make suitable drawings. The Committee stated that it was by practice alone that sketching efficiency could be achieved and drawings made easily understandable and more presentable. The Council of the Manchester District Association considered that the suggestion was an excellent one, and they expressed the hope that engineers in charge of undertakings would encourage the students under their direction to make a much more general use of notebooks, so that they might acquire greater skill in drawing, &c.

The President mentioned that a further point which had been raised in connexion with junior gas engineers at the last Council meeting, although it was not a new question, was the advisability of mid-week meetings being arranged for juniors. It could be appreciated, of course, that it was not always easy for juniors to be released from their works responsibilities during mid-week, and, unfortunately, the idea was not regarded entirely with favour by those in authority. Nevertheless the Council of the Association were convinced that any undertaking concerned would be able to realize that certain advantages would accrue from granting such permissions to attend meetings on other than Saturday afternoons. The full benefit of making works visits could not be gained by visiting undertakings when work was not actually in active progress during Saturday afternoons. On the other hand, junior gas engineers were advised not to make too frequent use of the concession if granted, and if a meeting could be arranged for a Saturday afternoon without any disadvantage occurring it should be done.

The President further pointed out that another matter which seemed frequently to recur was the granting of reasonable expenses to juniors upon the occasions of their visits to other works. The Council felt that all reasonable expenses should be borne by the undertakings.

Mr. C. A. Newham, President of the Yorkshire Junior Gas Association, expressed the appreciation of that body at the gesture made by the Senior organization.

Mr. C. S. Shapley (Leeds) mentioned that he had raised the question himself some little time previously. It was not fair to expect juniors to give up their Saturday afternoons altogether, and moreover, they should be given, as was the case in Leeds, some reasonable expensese allowance.

Elections to Council, &c., 1946

The ballot papers having been scrutinized, the President announced the results as follows:

President: G. E. Currier, M.I.Mech.E. (Bradford).

Vice-Presidents: T. R. Cook (Blackpool), Senior Vice; James MacLusky (Halifax), Junior Vice.

Hon. Secretary and Treasurer: T. Haworth (Wigan).

Committee: N. G. Appleyard (Leeds), J. Hood, M.B.E. (Birkenhead), D. T. Livesey (Doncaster),

Hon. Auditors: J. H. Richmond (Runcorn), A. F. Yates (Goole).

The President announced that Mr. Charles Bateman, who had resigned his membership of the Association upon going to Bath, had left a vacancy upon the Council which had been filled by Mr. J. H. Clegg (Marsden) for the remainder of Mr. Bateman's period of office. It was within the powers of the Council to nominate Mr. Clegg. Also, Mr. J. E. Wakeford, late of Warrington, had resigned from the Council, and his place had been taken by Mr. A. H. Nicholson, of Colne.

Mr. Currier expressed his appreciation and thanks upon his election as President of the Association.

Town Gas in the Glass Industry

A Paper entitled "The Use of Town Gas in the Glass Industry" was then presented by Mr. R. J. Bradshaw, Deputy Gas Engineer and Manager, St. Helens—see "JOURNAL" of Nov. 7. Two cinema films illustrating the various and complicated stages of glass manufacture, as carried on at the works of Messrs. Pilkingtons, St. Helens, were exhibited. They illustrated the production of plate glass, ordinary window glass, glass bricks, optical glass as used for microscopes, telescopes, binoculars, and many other scientific purposes, bottle manufacture, table and decorative glassware. The preparation of suitable sand, soda ash and limestone frit was also shown, as were also the processes of melting and blowing.

A Power Unloader for Small Gas-Works

Shortage of coal and labour demand an economical method of unloading railway wagons. On the other hand, many concerns find themselves doubting whether the number of wagons handled would warrant the cost of installing and operating a method of power-unloading in order to economize on man-power. By their introduction of the Right-Angler, Messrs. Strachan & Henshaw, Ltd., claim to have successfully answered the question.

The Right-Angler is capable of rotating a loaded wagon through approximately 90°, thereby causing the majority of its load to fall clear. The device is installed easily, and simplifies the tipping of coal into bunkers situated within 14 ft. of the track. In addition to the standard models, Right-Anglers can also be supplied as self-hauled mobile machines for unloading at any point beside the track, or, when used in conjunction with a turntable, serving both sides of the track.

The choice of a 10 h.p. internal combustion engine or a 5 h.p. electric motor is offered for operation of the tippler; in both cases the power developed is capable of tipping or, by de-clutching the drive and employing a capstan-head on the winch, rope-hauling a loaded wagon. The residue of coal left within the wagon after the 90° tip can be trimmed out by the tippler-operator within 10 minutes. Using this type of tippler it has been proved possible for one man to haul, tip, and trim three 12-ton wagons within one hour.

A Review of the possibilities of research as a spare time occupation for higher degrees and other purposes has been published under the title of *Research* (Publication No. 7*a*) by the Advisory Bureau for Research, 70, Victoria Street, London, S.W. 1 (1s. 5d. post free). It is pointed out that research is by no means the sole occupation of laboratory technicians. Almost without realizing it we are all continually learning new if not original facts, and the booklet aims at giving thinking people an insight into the potentialities of the subject and inspiring an interest in advanced study.

The British Gas Council's Kitchen Planning Exhibition which opened at Edinburgh on Nov. 3 has been very well attended. The exhibition was opened by the Lady Provost, Miss Diana Falconer, who congratulated the Gas Industry on ushering in a new era for women, and mentioned that the factories which had produced some of the exhibits were on war production up to a few months ago. Mr. David Fulton, Chairman of the Scottish District, outlined the policy behind some of the equipment shown.

Evaluation of Performance*

By LEOPOLD FRIEDMAN

WE are faced with an enormous reconstruction programme for dwellings, hospitals, schools, and almos tevery kind of building. All these buildings will require what are conveniently termed by the Board of Trade "Household Fitments," which in turn include heating, cooking and hot water apparatus of an estimated value of, at the very least, £50,000,000 during the next 10 years. It is very difficult to see how this demand is to be satisfied in view of the very low production capacity available and the present shortage of labour, plant and materials.

The production and distribution of household fitments is likely to be controlled to an increasing extent by such authorities as the Board of Trade, the Ministry of Fuel and Power, Local Government Authorities and so on. The individuals concerned may well be lacking in detailed technical knowledge of the standards to be adhered to by contractors and have to rely upon British Standard Specifications, Codes of Practice and other specifications having no legal force for which they have not been given the necessary facilities to understand and evaluate.

To take the example of instantaneous gas water heaters, it is well known to the Gas Industry that there exist British Standard Specifications for "Combustion Testing of Gas Appliances" (No. 717) and for "The Testing of Draught Diverters (Baffiers)" (No. 766). It is also well known that Codes of Practice have been set out to give guidance and general principles of installation as well as other matters on which only the most general statements can be made, since wide variations will occur in actual practice in different districts, even in different parts of the same district. It is, however, well known that the information given does not entirely cover the requirements of authorities specifying equipment, since they make no reference to the length of life to be expected, the district conditions, the maintenance required and the strength of materials. The larger gas undertakings have facilities for carrying out the comparatively few tests which are actually covered by existing specifications. The remainder have to rely upon outside sources for their information, and the national and local authorities most concerned with the equipment have neither the means of testing nor of evaluating test results which are presented to them.

Approximately 30%–40% of the heat requirements of an average household is used for providing hot water.† This assumes, of course, a minimum hygienic and social standard—to which those thousands of homes which have as yet no adequate means of hot water supply must be raised. A considerable shortage of houses existed in this country long before the 1914–1918 war. Great efforts to improve this situation are required after this war if we are honest in our desire for a reasonable all-round standard of living. The Government will have to sponsor large-scale building programmes, to assist the readjustment of industry to peacetime conditions. Naturally such a programme will have to give priority to the more urgent need of reconstruction of existing houses. It is not difficult to visualize, however, a building programme increasing to some 600,000 houses annually within five years. It will probably then decrease over the following ten or fifteen years to normal replacement requirements. Every one of these houses must have as an essential part of its equipment some means of providing ample supplies of hot water economically and cheaply.

Is it unreasonable to suggest that the hot water installations in our new post-war homes should be of the highest standard, and embody the latest technical refinements which present-day development can provide? Seeing these installations, people who have for years suffered through the inadequacy of the provision for this essential requirement of the home will demand such modern equipment. We can, therefore, expect a large proportion of the old, out-of-date installations to be scrapped and substituted by a more efficient means of hot water supply. The number of installations falling into this category is estimated at many millions. Take these with the normal annual replacements, and it would seem probable that nearly 1¼ million water heaters of one type or other—gas, electric or solid fuel fired—will be needed annually in the first post-war period.

Efficiency

We are all irritated almost daily by the use of the words efficient, efficiency, &c., where the words effective, effectiveness should be used. The engineer thinks instinctively of efficiency as a ratio, for example, of output to input, and not as just something that works.

In view of the national interest and the acute shortage of fuel it will be important for many years to come to ensure that fuel is used to the best advantage for all purposes. At the same time it is equally important that such factors as the capital cost of plant and equipment, the installation cost and running cost should all be kept low, and that these factors have to be balanced against the effective life of the plant or equipment; normally, the lower the capital cost the shorter the life.

These new factors alone, I think you will agree, show that there is a great need for understanding many problems connected with household fitments which will not be at once apparent to those responsible, but with which they have to make themselves acquainted. It is clearly also the duty and the privilege of the Gas Industry, including the responsible elements among the contractors, to bear their part in giving every possible facility.

WATER HEATING

In the position of both supplier and adviser a great responsibility rests on us as an Industry. The engineer has always a duty to his profession, to give clear and impartial opinions and advice when such is called for. In the problem of providing the heat services that are needed for the housing programme in this country gas should and will be called upon to make a major contribution. This is, however, no time for sectional interests or biased decisions. In choosing the means to provide any given service the decision must be guided by suitability and cost to the consumer; nor must the overall factor of national economy be overlooked. Of the many important facilities required in the house, as has already been mentioned, hot water is the largest single item. Gas is pre-eminently the fuel for this load, due to its special characteristics as the only fuel which can be controlled so as to release any amount of heat required instantaneously. Further, the overall efficiency through all stages from coal to hot water is incomparably higher than any other fuel. The actual figures* may be illuminating on this point:

Coal	24%
Coke	22.5%
Gas	45%
Electricity	14% / 21%†

The only appliance fully able to utilize the unique features is the instantaneous gas water heater. The instantaneous gas water heater is the only appliance which will ensure an inexhaustible supply of hot water at any time, without any preparation having to be made beforehand. The fuel bill can be exactly controlled, and is strictly proportional to the amount of hot water used. No juggling need be indulged in by the housewife to achieve that degree of economy which the household budget may dictate. While not wishing to decry the electric immersion heater, an excellent appliance within the limits set for it by the fuel it uses, by no stretch of imagination can it be said to fulfil the needs of these people with moderate incomes. The Government's decision to install electric immersion heaters as a summer standby in the Portal houses is already bringing forth a steady stream of complaints from the unfortunate tenants who must either light a solid fuel fire or pay 15s. a week to have any hot water; even the figure of 5s. 6d. found to be an average for all fuel expenses in 1939–40 proved a burden to many, expecially as the service bore no relation to the return given by a modern gas water heater of the instantaneous type.

Well before 1914 there were in existence gas water heaters of the instantaneous type with remore control, supplying more than one hot water tap. Large numbers of such water heaters are still giving satisfaction in this country. These water heaters were very strongly and solidly made and the cost was very high. The design was not reasoned in accordance with the principles of combustion, heat transfer, &c., as they are understood by us to-day. It certainly could not be said that such apparatus was ineffective, but whether the term efficient could justly be applied is very much a matter of opinion.

Cases have been known of water heaters constructed in accordance with the "trial and error" principle of evolution, having efficiencies as high as 90% or more on the basis of the gross calorific value. As a natural consequence the products of combustion barely rose above the outlet of the heater before becoming sufficiently cool to descend, while at the same time considerable condensation was apparent. The usual result in such a case was to arrange for bigger flue-ways (possibly by knocking some holes in the baffle plates or other such means), with consequent reduction of efficiency, and it came to be realized that there should be a high limit as well as a low limit to thermal efficiency, a matter to which we shall return when considering combustion.

Finally, the initial bench test efficiency of apparatus must be related to the efficiency to be found when the apparatus is installed in the consumer's house and the efficiency of use as operated by the consumer —figures which may be very diverse—and it is necessary that allowance

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* **Paper to the Western Junior Gas Association.**

† B.G.F. report on the planning of the Gas Industry, 1943. I.G.E. Communication No. 132, 1931, J. T. Haynes: "Two-Part Tariff or Aid to Gas Sales."

* I.G.E., No. 259, L. Friedman: "Possible Developments in Gas Water Heating for the Post-War Period."

† According to the Edgerton Report the average efficiency for the generation of electricity to-day is 20%. The maximum figure thought possible to-day is 30%. This would take some time to achieve as a national average.

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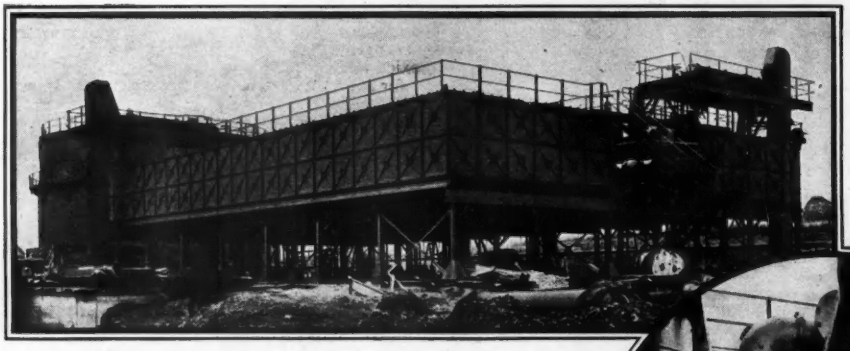

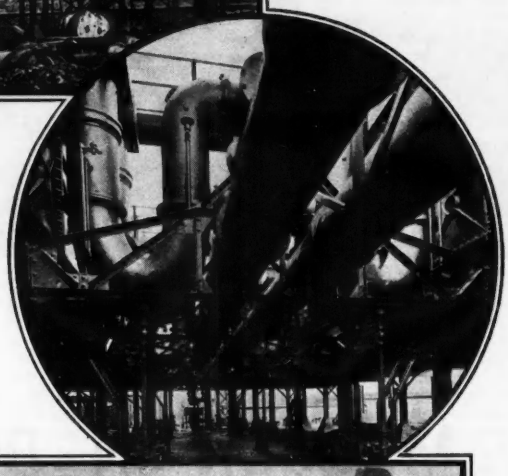

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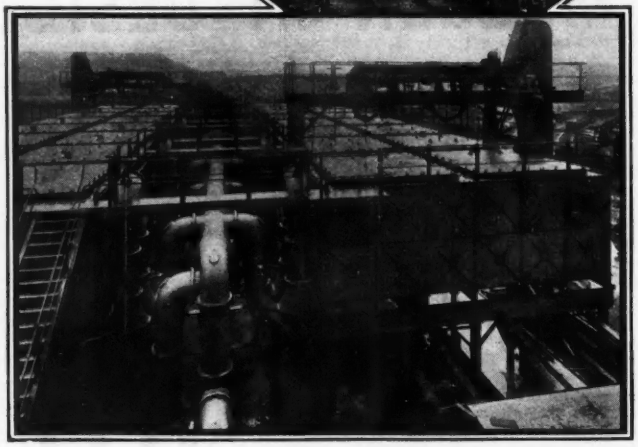
Top: General view. (In background, Gas-holder also erected by us.)
Inset: Showing Connections.
Bottom: Overhead view.



These Purifiers designed for a gross capacity of 8,000,000 cu. ft. of gas per day.

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be made for depreciation of efficiency very periods of time, due to various conditions of atmosphere, gas and water.

Before any apparatus can be designed, or a testing code evolved, it is necessary to consider a large number of factors which will include at least the following:

(*a*) What is the purpose of the apparatus?

(*b*) What are the precise requirements to be satisfied:

(i) Normal? (ii) Subnormal? (iii) Abnormal? (*e.g.*, when members of the family are away for long periods or when there are guests, or when the weather is exceptionally cold).

(*c*) What is the consumer willing to pay for the service?

(*d*) What is the consumer likely to be able to pay for the service? —not necessarily the same as (*c*).*

(*e*) What is to be the prime cost of the apparatus? (affected by innumerable factors; to mention only a few, design, material, wages, location of industry, transport costs, taxation, &c.).

(*f*) What is to be the selling price to—

(i) General public? (ii) Gas undertakings?
(iii) Government departments? (iv) Local government departments?
(v) Builders' and plumbers' merchants? (vi) Heating engineers?
(vii) Plumbers? (viii) Builders?

(Consideration of whole sales policy and price construction, not forgetting cost of welfare, advertising, exhibitions, technical service and so on.)

(*g*) Installation cost, including consideration of subsidies, mortgage, simple hire, hire purchase, rates of interest, depreciation, insurance (including that for broken contracts due to movements of the population for whatever cause), maintenance cost.

(*h*) How is installation to be carried out, and by whom, and who is to receive what margin of profit?

(*i*) How often is the apparatus to be maintained and how and by whom?

(*j*) What will be the fuel costs, and how will these compare with the amounts available from the household budget and the costs of competitive fuels?

STANDARDS OF PERFORMANCE

Standards can be divided into two general categories:

(*a*) Safeguards of a restrictive nature.

(*b*) Minimum standards which are boldly expressed, with full emphasis on the word "Minimum."

Category (*a*) would seem logically to be covered by Regulations and By-Laws, but there has been observed a distressing tendency for authorities issuing so-called standards to adopt a restrictive policy, which tends to prevent or hinder any new developments, such as the use of new principles, materials and designs which are considered to be "*Not* in accordance with standards." For example, standards for material tend to specify materials by name or constitution instead of specifying the performance required regardless of the name or composition of the material.

It has further been necessary to utilize the good services of the British Standards Institution, always so readily available, to produce standards which ought perhaps rightly to be enacted with the authority of the Ministry of Health as Acts and By-Laws. This is one of our curious ways of doing things the wrong way round, as it eventually happens that the British Standard is specified as such in the Act or By-Law.

B.S.S. No. 717, "Combustion Testing of Domestic Gas Appliances," lays down that the limit ratio of CO/CO_2 is not to exceed 0.02% under abnormal conditions. This specification originated in another country, where the minimum was laid down as 0.01% in any circumstances. This lower original figure was half the standard adopted by one of the principal manufacturers consulted, who worked to 0.005% and was made 0.01% only at the instance of other manufacturers who could not produce to this standard. When the British Standard was prepared similar objections were sustained, which emanated from existing manufacturers of apparatus who could not conform to the foreign standard and the limit was again amended. It is clear that such lowered standards can only hinder progress, since they reduce performance to a minimum and set a minimum standard without any incentive to improve.

Combustion

The amount of oxygen required to burn completely a known quantity of any gas or mixture of gases is readily ascertainable once the analysis is known. It is also interesting to note that quite independently of the analysis of a gas or mixture of gases, approximately 1,000 cu.ft. of air are required to burn a gas or gases completely, to produce one therm of useful heat at an apparatus efficiency of 75/80%.

The principal index for combustion is based on tests to determine the percentage of CO_2 present in the flue gases. If pure carbon were burnt in the exact amount of oxygen required for complete combustion, theoretically the flue gases would contain 100% CO_2. If, instead of pure oxygen, air was used, then as there is only 21% of oxygen in an average sample of air, there would only be 21% of CO_2. However, town gas is a mixture of various organic gases composed of carbon and hydrogen, together with free hydrogen, nitrogen, oxygen and carbon monoxide. Such a gas mixture, when burned in the exact amount of air for complete combustion, produces 21% of combustion products together with 79% nitrogen. Neglecting the free O_2 and N_2 the flue gases contain 21% CO_2 and H_2O. The affinity of hydrogen for oxygen is so great that anything but complete combination of these two components is impossible; in any case the result is harmless. Consequently, it has become normal practice to determine only the CO_2 content by taking a sample, drying it and measuring the CO_2. It will be apparent that this must be less than 21%, and in practice varies between approximately 10.5% and 13.8%, depending on the composition of the gases. This percentage is termed CO_2 max. As all gas appliances are designed to operate with a safety margin of excess air, to ensure that all the carbon is burned to CO_2 and none to carbon monoxide, the actual ratio of CO_2 in the dry flue gases will be less than the CO_2 max. of the particular gas. The minimum standard for excess air has been established so that the CO_2 shall never exceed 80% of CO_2 max. with 100% pressured overload at the inlet to the appliance.* In practice such precautions are essential, as one could never reach the CO_2 max. figure in the flue gases, owing to the increasing tendency for CO to be formed as excess air is decreased. For this reason, measurement of carbon monoxide in the flue gases is most important, for it does not necessarily follow that because the 80% CO_2 max. limit has not been exceeded the CO content is necessarily sufficiently small. The B.S.S. lays down that the ratio of CO/CO_2 shall in abnormal conditions not exceed 0.02.

It may be of interest to note, in passing, that before carbon monoxide is produced to a dangerous extent in any apparatus having enclosed, non-aerated burners, flame distortion will occur as the flames lengthen and lick and curl in reaching out for more oxygen. This appearance is sometimes described by the eloquent, if somewhat inaccurate, term "smothering," and a change of colour in the flame is also observable. In view of this, and lending point to the necessity for further assistance to be available to Government and Local Authorities, it is not surprising that such authorities—without knowing the reason—have on occasion ordered that lighting windows, provided so that the state of flames is immediately obvious, be entirely sealed off in case anyone should put their fingers in the flames. Thus in seeking to avoid a minor risk a major one could unwittingly be introduced.

It is also interesting that even members of the Industry and representatives of manufacturers of gas apparatus have a tendency to guess the heat input by looking at the size of the flame, instead of reading the gas meter over a given period while the apparatus is in use. The flame size will differ from district to district in accordance with the air requirement of the local gas supply and may vary very considerably with design—a burner which I saw recently had flames of so small size that it seemed incredible for the actual heat throughput to be as high as it was.

Rating of Appliances

Having regard to the degree of efficiency which is economical and in keeping with all the other considerations upon which we have touched, it is necessary to specify performance which, in the case of heating apparatus, will take the form of rated heat output in B.Th.U. per hour or per minute. In specifying such a figure, allowance must be made for a margin of safety, to cover variations in input and output due to any of the following factors:

(*a*) Variations in gas pressure.
(*b*) „ in specific gravity.
(*c*) „ in calorific value.
(*d*) The accuracy of original regulation.
(*e*) Errors due in checking the input and output on maintenance visits.
(*f*) The applied competence of the maintenance man.

* This is not in B.S.S., but has been adopted by several manufacturers in this country as an additional safeguard.

* See *Household Budgets, Weekly Expenditure of Working Class Households in the United Kingdom*, H.M.S.O., 3d., to be adjusted by the figures produced in August, 1945, by the T.U.C. assessing ranges of net income after deduction of income tax. Numbers of individual incomes assessed:

Range of income, after tax. £	1938–39.	1942–43.
150–250	4,500,000	7,000,000
250–500	1,820,000	5,300,000
500–1,000	450,000	550,000
1,000–2,000	155,000	117,750
2,000–4,000	56,000	31,000
4,000–6,000	12,000	1,170
6,000 and over	7,000	80
Totals	7,000,000	13,000,000

(g) Changes occurring in the apparatus during its working life, such as deposition of dust and dirt (1,000 cu.ft. of uncleaned air per therm):

(i) Reduction of area of flue-ways due to deposit of cooked-on dust and dirt and anhydrous corrosion deposits.

(ii) Increase in area of flue-ways due to the corroding away of metal and to maintenance, &c.

In passing, reference might be made here to the desirability of standardizing the basis of arriving at the catalogue input. The B.S.S. for combustion specifies 100% pressure overload equivalent to 142% of rated input as permissible, without exceeding 0.02% CO/CO_2. If this were combined with the 80% CO_2 max. limit, it might form a useful basis for specifying catalogue input. On this basis the manufacturer's catalogue input would be 71% of the limiting input according to B.S.S.

INTERPRETATION OF LABORATORY TESTS AND EVALUATION OF APPLIANCES

Flue Gas Analysis

We have already seen that existing standards do not set a very high limit; in fact mere compliance with B.S.S. in so far as gas appliances are concerned will certainly not ensure a long trouble-free service to the user. The Gas Industry, through its engineers and technicians, is well able to carry out tests and assess the value of available appliances. However, it is becoming increasingly clear that those on whom rest the decisions as to equipment to be installed in houses to be built in the next decade or so may not always have the technical knowledge or experience which it would be desirable for them to possess, in order that a just choice of the right equipment may be made.

The manufacturer has a considerable responsibility when distributing large numbers of appliances. The larger the number and the better the reputation the greater the responsibility. It is assumed, and generally admitted with every justification, that he will at all times maintain the standards of performance of his appliances. No matter how good and effective the control of production may be, this will by itself prove insufficient safeguard unless continuous laboratory checks are made to prevent a falling-off in performance.

The basis for most laboratory tests on water heaters is CO, CO_2 and O_2 measurement of the flue gases.* From a complete series of such measurements can be plotted what is commonly referred to as the thermal characteristics of the appliance, illustrated in fig. 1.

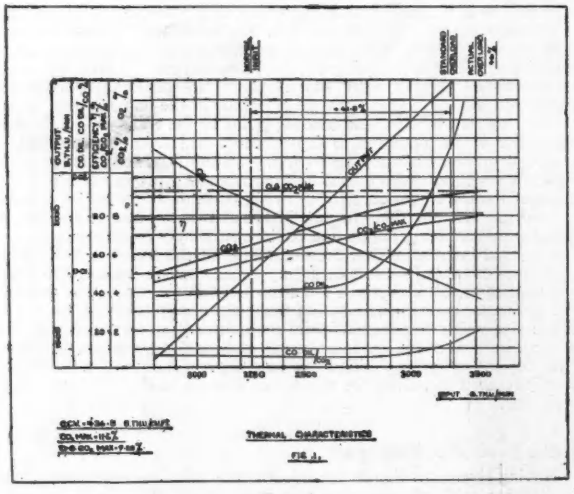

FIG. 1.

Although other tests must also be carried out, the basis on which final judgment rests is the "thermal characteristic" test.

Studying fig. 1 in greater detail will show that the output curve is almost a straight line. It will also be noted that in this case the efficiency remains almost constant over the whole range of the test, starting at 79% with an input below that specified by the manufacturers, and rising to a fraction over 80% at the limiting overload output.

The most interesting curve is, however, the CO_2/CO_2 max. As explained earlier, the ratio of the actual CO_2 in the flue gases to the CO_2 max. indicates not only whether combustion is complete, but how far the air supply is in excess of that required for complete combustion. It will consequently also be clear that from the behaviour of the CO_2/CO_2 max. curve under conditions of increasing overload we can judge the degree of safety of the appliance as regards combustion. It was earlier mentioned that a reasonable criterion for limiting conditions which has been adopted by some manufacturers in addition to the safeguards of B.S.S. 717 is a value of 80% for CO_2/CO_2 max. In fig. 1 this value is reached at an input of 3,300 B.Th.U./min., giving an overload margin of 46%.* B.S.S. 717 specifies that the limiting condition for combustion is a CO/CO_2 ratio of 0.02% at 100% pressure overload, or 41.5% heat input overload. Referring to fig. 1, it will be seen that at 141.5% of standard heat input the CO/CO_2 ratio is 0.0025%—far below the limit set in B.S.S. 717. So far the heating body under test has reached the required standard for efficiency and combustion standards, but compliance with these alone will not suffice to ensure it a long maintenance life. It is clearly essential that the appliance shall continue to maintain its thermal efficiency and good combustion characteristics for as long a period as possible. This point will need to be checked by a special test designed to simulate prolonged usage on the district, and usually referred to as a "life test." Some indication of the manner in which an appliance will behave on such a test can be got from the thermal characteristics curve, though it will only be an indication, and will need confirmation. Just as when an appliance is overloaded, so after many months of use on the district the CO_2/CO_2 max. ratio rises. The time taken for this ratio to reach 80% is termed the "life of the appliance" and will determine the allowable period between maintenance calls.

It will now be understood that given two appliances equal in every respect save that the CO/CO_2 max. curve of one rises less steeply than the other, the appliance with the less steeply rising characteristic would probably have the longer life. While this cannot be taken as a certain guide, it can serve as a useful pointer to the results to be expected from a life test.

INTERPRETATION OF TEST RESULTS

The examination of a few examples of thermal characteristics may serve to clarify the implications of the form of the curves and the deductions that the designer can make from them. Fig. 2 shows the thermal characteristics of a typical multipoint, but has four CO_2 curves. These curves show the effect of small modifications to the appliance. To make the diagram easier to follow only the CO_2 curves for the four variations have been plotted together with one set of the remaining curves.

It will be observed that the starting values of the CO_2 for the four appliances are all of the same order. The slight divergences in starting value and rate of increase bring about considerable divergences in the overload margins. The main points of interest from figs. 2, 3, 4 and 5 are summarized in Table I below.

TABLE I.

		CO_2%.	CO_2/CO_2 max.	Efficiency.	Overload margin.
Fig. 2	A	6.7	59.8%	76%	37.5%
	B	7.0	61.8%		30.0%
	C	7.2	63.2%		28.0%
	D	7.4	65.0%		24.0%
Fig. 3	E	7.3	62.3%	78%	30.0%
Fig. 4	F	7.2	60.3%	80%	28.5%
Fig. 5	G	5.2	44.0%	72%	89%

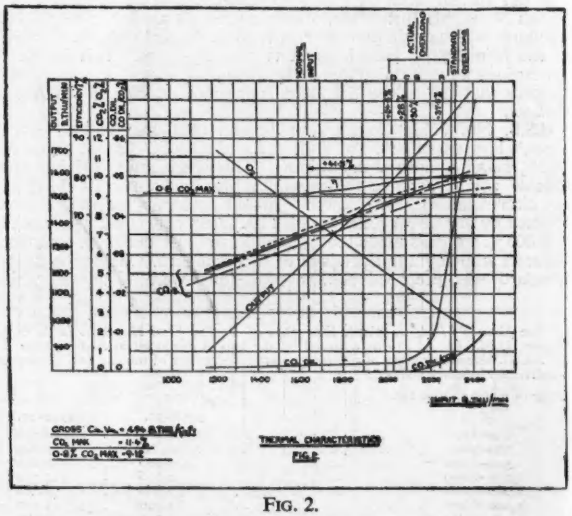

FIG. 2.

* 1. The necessity for a CO test requires no explanation, as CO is the only harmful component of the flue gases. Although other measurements are made to judge the standard of combustion, a direct measurement of the carbon monoxide is still advisable.

2. The percentage of carbon dioxide in the flue gases in conjunction with the CO_2 max. figures serves as a sound guide to the standard of combustion. A knowledge of the CO_2% in the flue gases is necessary to calculate the CO_2 max.

3. The percentage concentration of O_2 in the flue gases is used to determine the (*a*) excess air and (*b*) the CO_2 max. figures, as shown below:

(*a*) Excess air $\% = \dfrac{N}{N - \frac{79}{21} O_2}$ where $N = 100 - CO_2\% - O_2\%$.

(*b*) CO_2 max. $= \dfrac{21.CO_2}{21 - O_2}$

* $\frac{3,300}{2,250} = 1.45 = 46\%$ overload.

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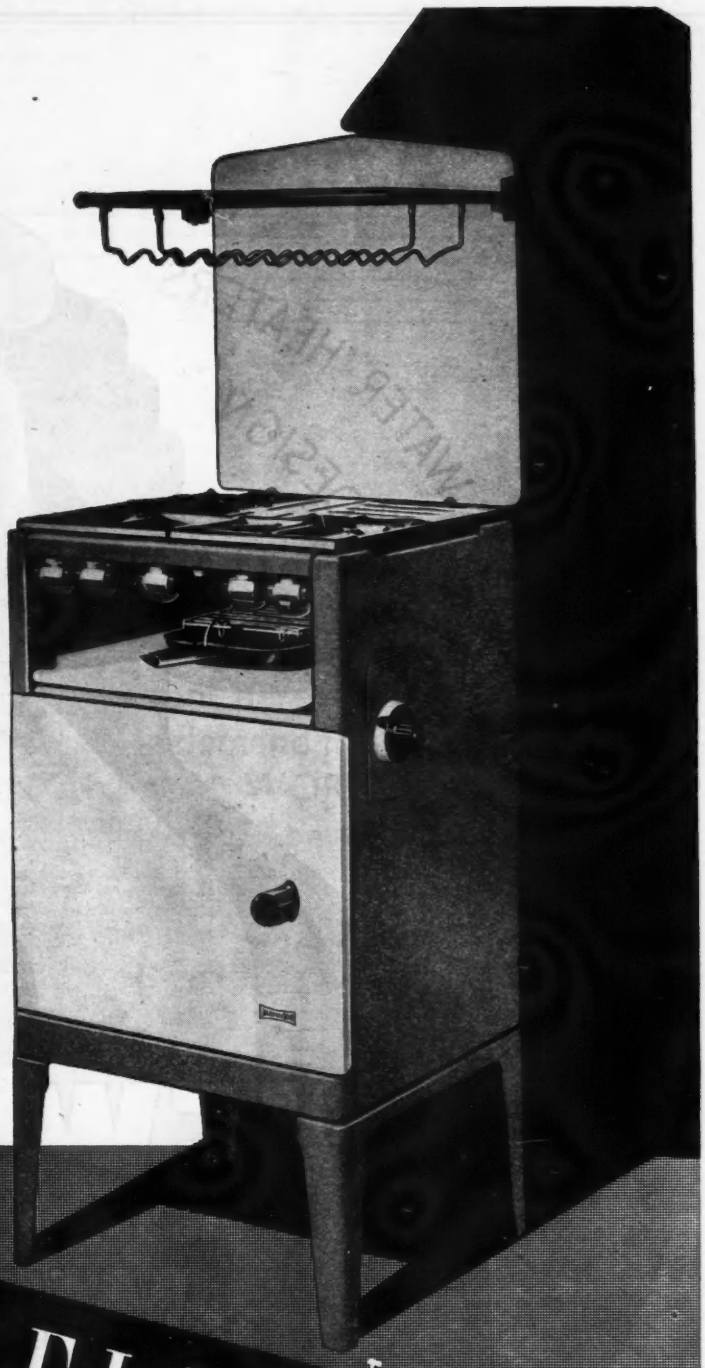

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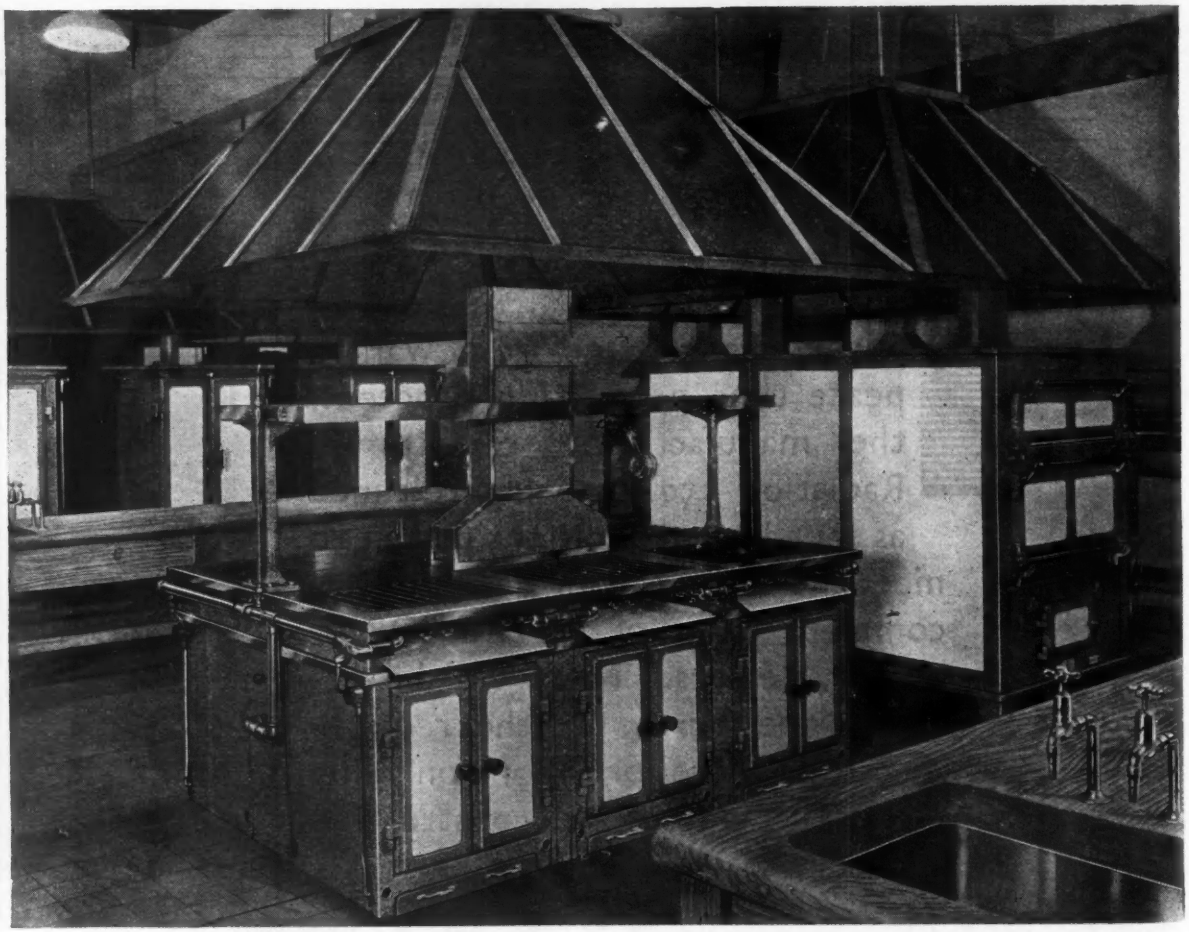

View of part of the Principal Kitchen in a large Canteen, showing Range, Baking Ovens and Roasting Ovens

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From the curves and the summary in Table I it can be seen that the overload margin increases as the starting CO_2 value is decreased. This follows quite logically, as a low initial CO_2 implies a large percentage of excess air with quite clearly a correspondingly large capacity for overload. The British Standard Specification for combustion gives two limits, one of 50% pressure overload corresponding to 28.0% heat input overload for governed appliances, and 100% pressure overload or 41.5% heat input overload for ungoverned appliances. Consequently A, B and C in fig. 2 would come within the B.S.S. 717 for governed appliances, but would not satisfy B.S.S. for ungoverned appliances. Continuing our comparisons, appliance "E" in fig. 3 has a high starting value for CO_2 compared with appliances A, B or

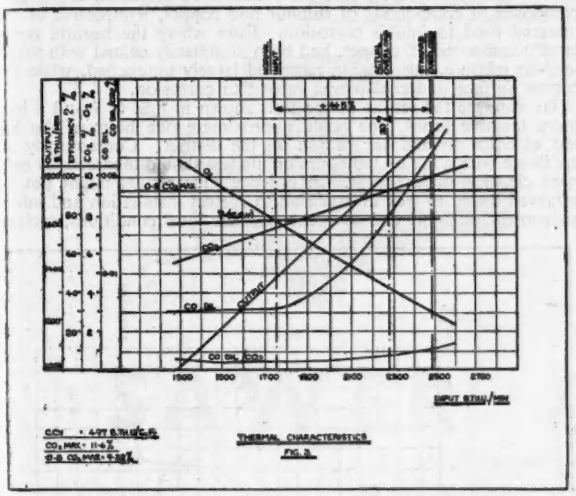

FIG. 3.

C, and yet has a higher overload margin than might on this basis have been expected, due to the less steeply rising CO_2/CO_2 max. curve. Hence one might expect the life of appliance "E" to be a little longer, other things being equal, than C or D.

Appliance "F" in fig. 4 has a slightly lower initial starting CO_2 than appliance "E" and the CO_2/CO_2 max. is definitely lower, yet the overload margin is only 28.5%. This is due to the more steeply rising

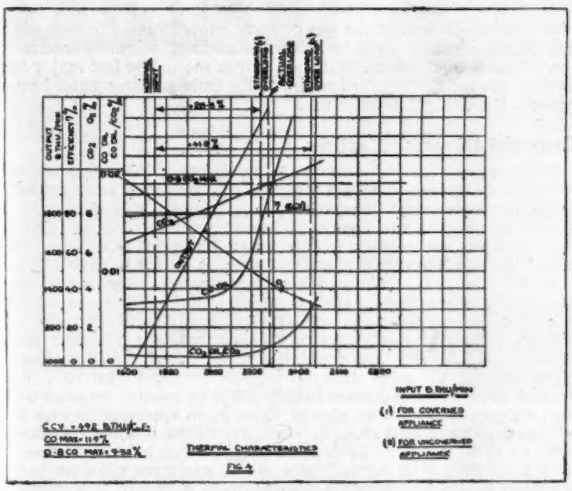

FIG. 4.

characteristic of the CO_2 curve. Appliance "F" in fig. 4 is therefore approximately comparable with appliance "C," but would probably have a slightly shorter "life." As a final example of pre-war appliances fig. 5 shows the results in the case where the designer was prepared to sacrifice both efficiency and cost of raw material to achieve a long life. The CO_2 is much lower than any of the previous examples, and the overload margin, exceedingly high. The efficiency was, however, only 72% and the weight of metal in the heating body very considerable, being in fact the heaviest one ever tested.

It is appropriate to remember at this point that while the designer of an instantaneous water heater must always have as his goal perfection of performance, he must also, like a designer of any other appliance, be continuously striving to reduce its cost, and I have yet to find an instance where these two requirements are not in conflict. It also frequently happens that in attaining good results in one direction features inimicable to satisfactory performance in other respects may be introduced. Such was the case with appliance "G" in fig. 5, where the weight of metal was considerably above the average standard, with consequently long heating-up time; unsatisfactory after-heating effects manifested themselves as banging noises when the appliance was turned off. These effects will be referred to in more detail when we come to discuss the method of testing automatic valves.

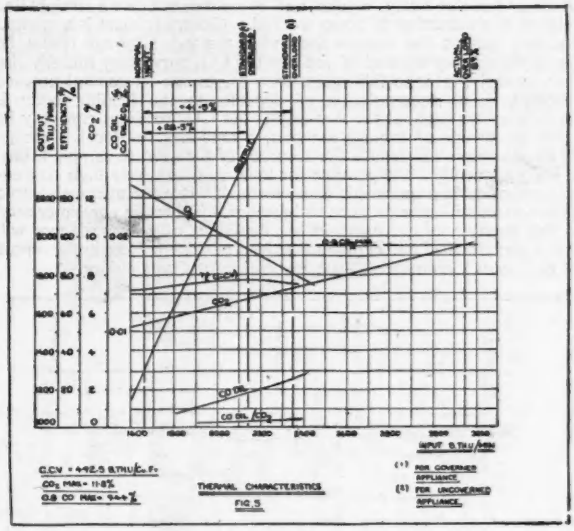

FIG. 5.

Accelerated Life Test

Having established that a good appliance satisfies requirements set by B.S.S. for combustion, it must next be determined whether this appliance would have a reasonable maintenance life. This factor is of great importance in so far as upkeep costs are concerned, being the determining factor as to how often maintenance will be required. Manufacturers of instantaneous gas water heaters are fortunate in certain respects, as it is a characteristic of instantaneous appliances that they are only in operation for a comparatively short period of their life. Consequently it is no difficult matter to devise means for giving the appliances an accelerated test. With other types of appliances continuously in operation such methods could not so easily be adopted. It would not suffice to put an instantaneous water heater into continuous operation to assess the number of hours it would run before maintenance was required, as these conditions would be more favourable than those appertaining when on the district. The conditions of actual use approximate very closely to a series of short operations; first, in giving the appliance sufficient time to reach a steady temperature, and then allowing it to cool down again. In practice, both to save time and slightly to increase the severity of the tests, the water flow to the appliance is controlled in such a way as to allow the automatic valve to open and put the appliance into operation for just sufficiently long to raise the temperature of the whole appliance to a steady maximum. The water rate is then reduced to such a level as to cause the automatic valve to close, but still allow cold water to pass through the appliance and accelerate the cooling process. After sufficient time has elapsed for the appliance to be cooled approximately to room temperature, the water rate is again increased, thus repeating the cycle. It would serve no purpose to describe in great detail the apparatus used for these tests, particularly as any undertakings wishing to carry out these tests themselves could not do better than obtain copies of the Watson House test methods and description of the life test equipment. Briefly, it should be explained that the appliance put on test must be complete, as it would be installed in a consumer's premises—*i.e.*, outer shell should be fitted, together with the draught diverter, and a 2 ft. length of vertical flue pipe of the size specified by the manufacturers. In short, the whole test is intended to reproduce in the laboratory as near as is practicable conditions of use which would exist on the consumer's premises. The test is left in operation, CO_2 and CO measurements of the flue gases being taken at reasonable intervals, until limiting conditions for combustion are reached. Some divergence of opinion exists as to what constitutes limiting conditions, but here again the limit of 80% CO_2/CO_2 max. has been adopted as the most practical indication of limiting conditions. There is a school of thought which prefers to specify the limiting percentage of CO_2. This raises the difficulty, as gas compositions vary considerably from one undertaking to another, and where for instance 9% CO_2 might be a reasonable limit with a gas having a CO_2 max. of 12.2%, it would obviously be far too high in the case of another gas whose composition gave a CO_2

max. of 10.5%. It is not uncommon for an appliance to break down in some respect during the course of such tests. In such a case it is necessary for the test to be stopped, repairs carried out and the test re-started, since any disturbance of the appliance during the course of the test might invalidate the conclusions which could otherwise be drawn from the results. During the course of such a test it will be found that there is a steady increase in the volume of corrosion products in the heating body and flue-ways. As a consequence, the free passage for the flue gases is progressively reduced, and causes the amount of excess air to fall, and the CO_2 to rise. This increase in the CO_2 is not always regular, and by no means bears a straight line relation to the number of hours worked. Generally there is a marked and very sudden rise towards the end of the test, although it may be found that before the end of the test the CO_2 curve may initially rise quite sharply, later to fall again, then to resume its general upward tendency. The accumulation of deposits in the heating body is rarely even throughout the flue-ways. As CO_2 readings can only be taken by means of average samples, a tendency for local blockage of the flue-ways will reduce the accuracy of the average sample taken. It is consequently quite possible for local comparatively high concentrations of carbon monoxide to be formed, while the average sample of flue gases still appears to be satisfactory. Those who are interested in the question of corrosion in the flue-ways of gas appliances will find a very detailed and complete analysis of this problem in the report of the Leeds Committee of the Institution of Gas Engineers.*

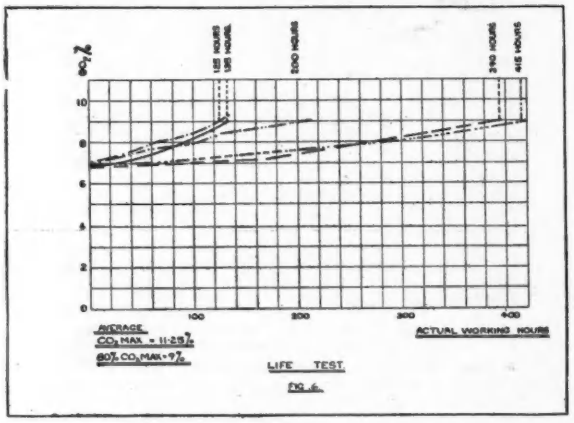

FIG. 6.

Fig. 6 is a typical curve of the rise in CO_2 during a life test. In this case five different appliances of different makes were tested simultaneously. All the appliances were quite well known and enjoyed reasonable popularity before the war. This particular test was interesting because the initial CO_2 of all the appliances was practically identical and in the range of 6.8 to 7.1%. With the particular test gas used, 80% CO_2/CO_2 max. = 9% CO_2, and this figure was reached after 125 hours in the case of the worst appliance and 415 hours in the case of the best appliance. Fig. 7 is another example of life test results, in this case with three appliances of identical make, but with slightly differing design chracteristics. Here again quite small differences in details of the design resulted in a maintenance life of 246 hours in the worst case and 480 hours in the best case. Fig. 8 shows the life test of the same appliance whose thermal characteristics were shown in fig. 5. Although this appliance had the exceptionally long life of 635 hours, the result was only achieved by sacrificing thermal efficiency and by heavy expenditure of raw material. In endeavouring to interpret the results of such tests, it must not be overlooked that the quality of the gas will have a very considerable influence. A gas with a very low sulphur content will invariably effect a very considerably longer life. Those who are especially interested in the influence of sulphur on the general question of corrosion might well refer to the reports of the Leeds investigation. It is of interest to note that this investigation confirmed the observations of manufacturers over a number of years, that the products of corrosion are largely composed of compounds of sulphur and copper, irrespective of the material used to inhibit corrosion. Even where the heating body, largely composed of copper, had been completely coated with tin or lead-tin mixture, this coating remained largely untouched, while the copper surface underneath was subject to corrosion.

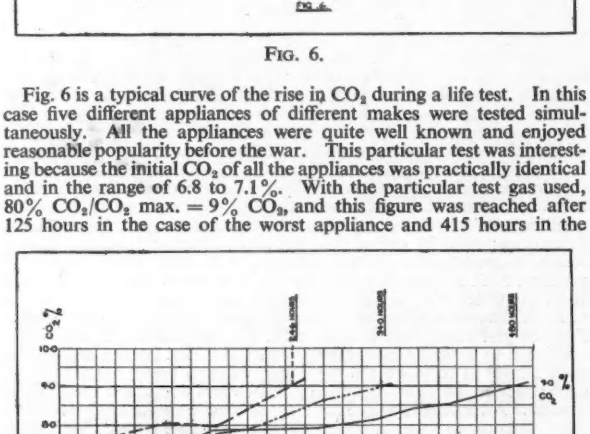

FIG. 7.

To translate the results of the tests shown in figs. 6, 7 and 8 into more tangible terms, one could approximate one hour of the life test as equal to one day of use on the district. Consequently an appliance with a life of 360 hours on life test should theoretically only need cleaning once a year. In practice such results might not be achieved owing to lack of attention to correct installation and initial adjustment, possibly due to some peculiar local conditions, such as high sulphur content in the gas or some other unusual feature of the gas composition, or even to adverse flue installation. Mention of the influence of the flue installation brings me to the last major test, to establish the fitness or otherwise of the instantaneous water heater, namely, the draught diverter test.

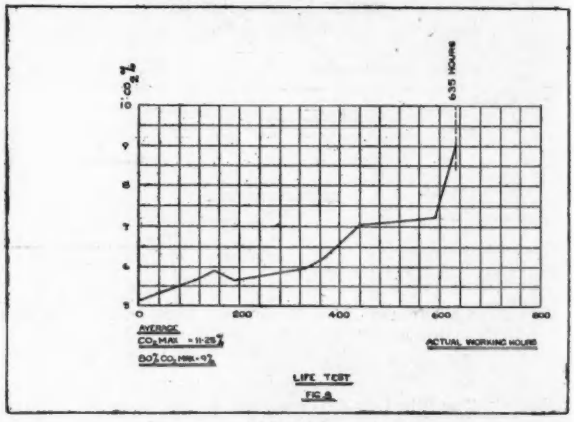

FIG. 8.

Draught Diverter Testing

Little can be added to our present knowledge of the design and performance of draught diverters that had not been fully and excellently presented in a most comprehensive paper on this subject.* It should be stressed, though, that however good the draught diverter may be, it was not intended to compensate for an inadequate or faulty flue. The function of the draught diverter is to ensure that the combustion within the appliance shall remain within satisfactory limits, irrespective of intermittent adverse flue conditions. It is undoubtedly true that lack of attention to correct flue installation in the first instance is the cause of many complaints regarding excessive maintenance. B.S.S. 766 lays down that ". . . the carbon dioxide content of the flue gases shall not increase by more than 10% of its normal value in an appliance having 100% or greater pressure overload margin, or 5% of its normal value in an appliance having only 50% pressure overload margin, when the baffler is subject to down-blow up to 60 m.p.h. or up-draught up to 30 m.p.h., nor decrease by more than 20% of its normal value in any appliance when the baffler is subject to down-blow or up-draught up to 20 m.p.h." It might be noted in passing that this Standard has inadvertently been drafted in such a way that the conditions of its fulfilment become increasingly severe as the standard of the performance of the appliance is increased. The variation in the CO_2 brought about by down-blow or up-draught is expressed as a limited percentage increase or decrease of the normal CO_2 of the flue gases under standard conditions. Consequently the lower the normal CO_2 of the appliance, the smaller the variation permitted by this standard. The method of test consists in creating a forced draught of the required velocity. The latter is measured by means of pitot tubes, and measurements made of the CO_2 in the flue gases of the appliance. These measurements are repeated throughout the whole range of velocities specified in the standard, and when

* *Corrosion from Products of Combustion of Gas*, Joint Research Committee of the Institute and Leeds University. Part I, Preliminary Investigations, No. 76, I.G.E.; Part II, Tube Experiments, No. 100, I.G.E.

* "Baffler Performance in Relation to the Safety of Gas Appliances," by T. J. Legg and T. G. Noble.

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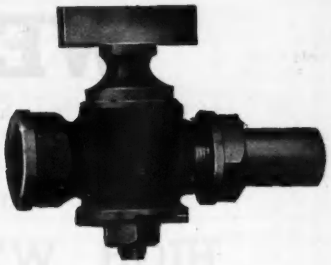

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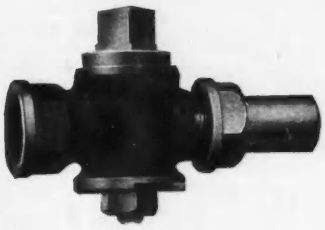

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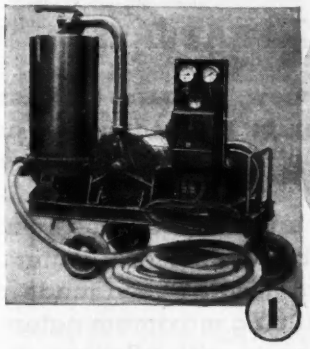

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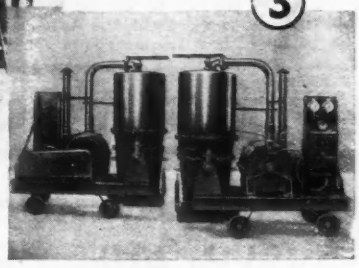
3



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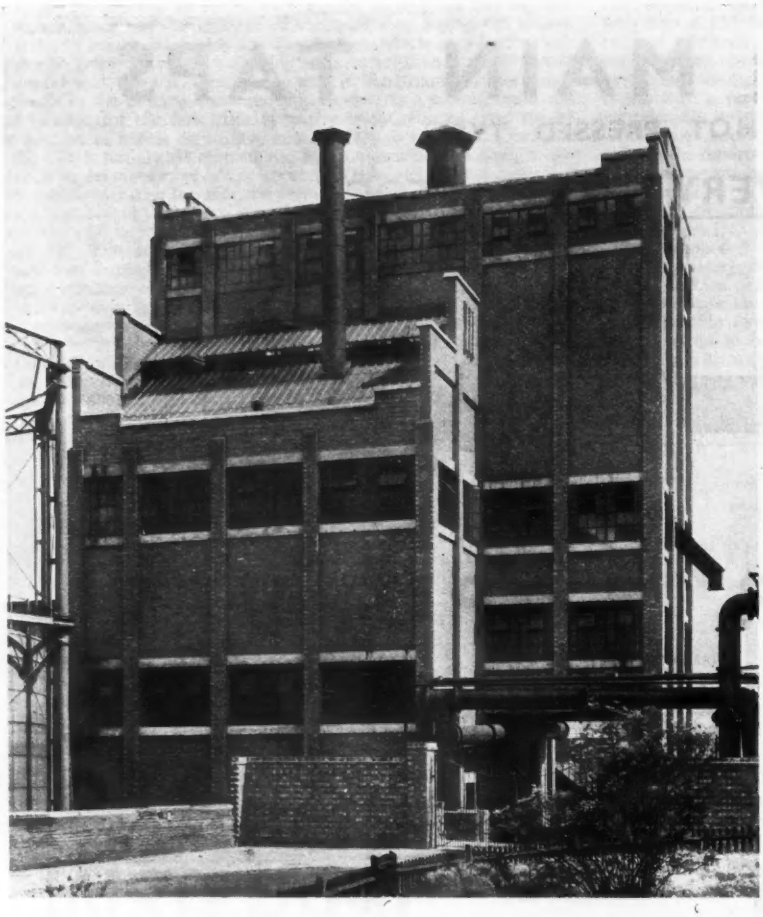

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Vertical Retorts

at

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ARCHITECTURAL FEATURES

From the layman's point of view, perhaps the most interesting feature is the attempt to produce in an essentially industrial building a pleasing architectural appearance. The steel frame-work of the building has been encased in brickwork, and the coal-receiving annexe and coke hoppers are built as integral features of the main building. A liberal use has been made of steel-framed windows for producing maximum natural lighting and ventilation. Parapets with "Snowcrete" coping form a pleasing finish to the skyline. Rain-water pipes are not visible, being taken down internally. The full effect of the building when viewed from Desborough Road is masked to some extent by the abutment of the old horizontal retort house, but when this is dismantled and the new retort house extended it will appear as an independent and symmetrically designed structure.

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plotted give results of the form shown in fig. 9. The tests described so far have been primarily concerned with the combustion standard for gas water heaters. These are, however, not the only factors which the designer must bear in mind, for the ultimate performance and life of the appliance can be just as much influenced by the operation of the automatic valve. It is the function of the automatic valve to permit of gas passing to the burner when a water tap is turned on so as to permit sufficient water to flow through the appliance for heating. To permit of steady and smooth ignition of the gas issuing through the

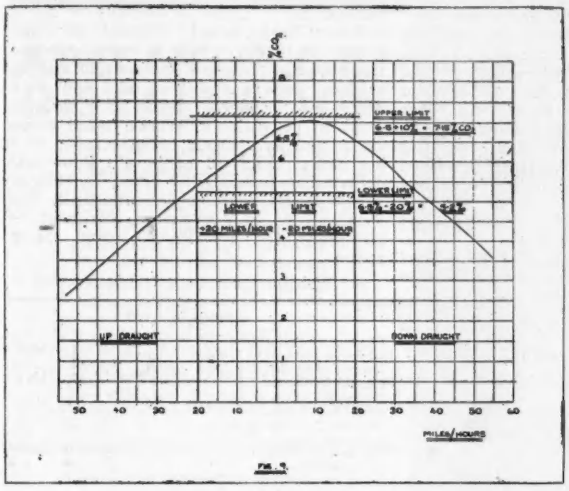

FIG. 9.

burner the opening of the gas valve must be such as to permit a gradual increase of the gas rate up to the fully open position. However, when the water flow stops and the valve closes, it is essential that the interval between the water flow falling below the minimum, to maintain the valve in the open position, and the closing of the gas valve should be as short as possible. This time lapse has a marked effect on what is known as the after-heating effect. It has been observed that the temperature of the water in the coils of the instantaneous water heater, immediately after the gas has been turned off, tends to show a small initial rise. This is due partly to the slight delay in the closing of the gas valve, causing additional heat to be imparted to the water after the flow has ceased, and has a secondary effect due to the stored heat in the body of metal comprising the heating body and heat exchanger. To reduce the latter effect the designer strives to use the minimum weight of copper compatible with the requirements of safety in other directions, and to minimize the effects of continued burning of gas after the water flow has ceased, it is obviously essential for the gas valve to close as rapidly as possible. The problems raised in this direction become of some importance where appliances are required to deliver water at a high outlet temperature. In such appliances, should by coincidence the cold water inlet temperature be unusually high and at the same time the gas rate be excessive (due, for instance, to tampering), the margin between the maximum hot water outlet temperature and boiling temperature would be small. Owing to the rapidity with which the gas valve closes, it is difficult

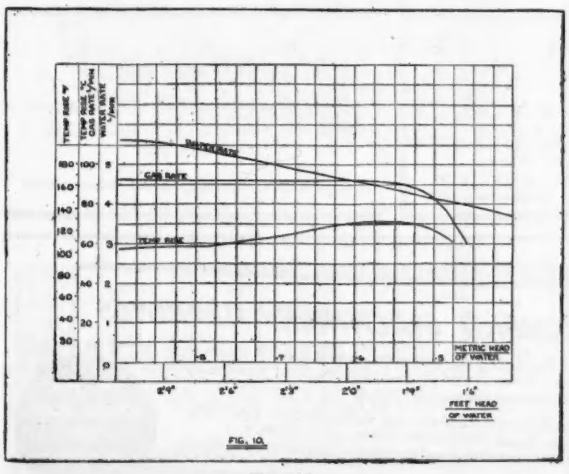

FIG. 10.

to take exact measurements in conditions that exist in normal practice. On the other hand, if the closing of the gas valve is artificially slowed down, as can be done by gradually decreasing the inlet water pressure and consequently the flow, other factors, such as frictional loss in the automatic valve, would not be taken into account. The only solution available is to carry out two independent tests, the first allowing the gas valve to close quickly, taking readings of the temperature rise at different points of the heating body. The second test is to slow down artificially the closing of the valve, then compare the decrease of water pressure and flow with the decrease of gas rate and temperature rise. These two tests should be carried out both before and after the accelerated life tests. This will determine whether any variation has been brought about through wear and tear of movable parts or frictional losses due to corrosion or other reasons. An example of the results obtained from the second test with artificially slowed closing of the gas valve is given in fig. 10. The temperature rise immediately prior to the closing of the gas valve and during the first stage of the closing is clearly apparent. This, taken in conjunction with the maximum temperature reached after normal quick closing, gives a clear indication of the safety margin in abnormal conditions.

CONCLUSION

The Gas Industry, in common with all other industries in this country, is faced with an extensive reconstruction programme. Our position in relation to the whole programme is a vital one, because largely on our ability to meet the needs of the day will depend the success or otherwise of the Government's expressed determination to provide the homes so urgently needed and of the high standard which is so desirable. The present provides us with an opportunity to eliminate for ever the stigma of bad housing with inadequate facilities. It is disgraceful but true that even before the war there was serious overcrowding, and even in such conditions it was almost incredible that 60% of the dwellings in this country should have had no means of providing hot water on tap.

Gas has unique properties which render it more suitable than any other fuel for providing economically and automatically a full service of heat in the home. Of these services, the provision of hot water ranks high in priority, and certainly forms a large proportion of the total heat requirements of a family. In the instantaneous gas water heater the Industry has an appliance which is capable of providing a fully automatic supply of hot water which will meet all the requirements of households with limited incomes. Not only are running costs low, but they are strictly controllable by the consumer and directly dependent on the consumption of hot water. It should also be remembered that the installation of an instantaneous heater ensures saving, in auxiliary installation costs, for distribution pipes, hot water storage tanks and cylinders. The instantaneous water heater is a highly developed appliance, designed on scientific principles and of proved reliability. I have always been an advocate of the policy of providing as much technical information as possible concerning applicances offered for sale to the public. There would seem to be an even greater need at the present time for such information. The dissemination of full technical information by both manufacturers and the Gas Industry might help to dispel the illusion so common in the minds of the general public that gas appliances are somehow out-of-date and unscientific in their design, whereas in the minds of many the electrical counterparts are regarded as highly scientific and modern. It is, however, unfortunately true that whereas the design of domestic gas appliances is highly complex and demands the balanced dovetailing of the work of many scientific minds, the corresponding electrical appliance demands no more than common sense for its design. There would here seem to be an opportunity for the Gas Industry as a body to educate the public more widely as to the large amount of scientific work connected with gas manufacture, distribution and appliances designed for use with gas.

Scottish Tar Distillers, Ltd., have acquired the whole of the business interests in Scotland of Richard Smith, Ltd., and of the Shettleston Oil and Chemical Co., Ltd. The tar distillation sections of these two companies will be conducted in future by Scottish Tar Distillers, Ltd., while the acid and chemical departments will continue to be carried on by Richard Smith, Ltd., at their West Street works, Glasgow.

An Exhibition of local industries and the contributions they made to the war effort is being held at Hyde, Cheshire. The North Cheshire Gas Company is showing infra-red paint-drying tunnels, a variety of air-gas mixing valves, milk pasteurization plant in action, and large industrial cooking appliances which have played an important part in feeding millions of munition workers.

Presiding at the 84th annual meeting of the South Australian Gas Company at Adelaide, Mr. F. G. Scarfe announced a trading profit for the past year of £142,086, compared with £143,491 for the previous year, and a dividend of 5%. A falling off in gas sales for the production of munitions had been more than made good by increased domestic sales. In secondary industries and for commercial purposes there had also been a considerable gain of new business. With the removal of Government restrictions on the sale of heating and cooking appliances, business in the showrooms had increased. Close attention was being paid to the extension of mains and services for new housing estates. There was a particularly busy time ahead, and the Company was facing the future with confidence.

GAS PRODUCTS PRICES—STOCKS AND SHARES

The London Market Nov. 19.

There are no changes to report in the prices of Coal Tar Products.

There have been two developments of interest in connexion with Coal Tar Products, the first being the cancellation of Government contracts for toluene, and the second the issue of the Control of Benzole and Allied Products Order, 1945 (S. R. & O. 1945, No. 1064), which came into force on Sept. 1 and brings all Coal Tar Spirits under one and the same Order.

As from March 5, by the Coal Tar Products Prices Order, 1945 (S. R. & O. 1945, No. 229), the maximum price of Pitch for briquetting has been increased to 60s. per ton f.o.r. supplying works, and the prices for Road Tar, as fixed by the Coal Tar Products Prices Order, 1943, S. R. & O. No. 1528, have been increased by one half-penny per gallon. There is also an increase of 5s. per ton in the price of standard Creosote/Pitch Mixture.

Coal Tar Products Prices (No. 2) Order, 1944 (S. R. & O., 1944, No. 1051), allows increases in the maximum prices for all forms of Naphthalene.

The Provinces Nov. 19.

The average prices of gas-works products during the week were : Pitch and Crude Tar,* Toluole, naked, North, 90's. 2s. 4d. to 2s. 6¾d., pure, 3s. 2¼d. Carbolic acid, 60's, anthracene, creosote oil (hydrogenation), coal tar oils (timber preservation, &c.), and strained anthracene oil controlled by the Coal Tar Products Prices Order, 1943, dated Oct. 20, 1943 (S. R. & O. 1943, No. 1528), operative from Nov. 15, 1943, Naphthalene controlled under S. R. & O. 1944, No. 1051, operative from Sept. 22, 1944.

Attention is called to Coal Tar Products Prices Order, 1945 (S. R. & O. 1945, No. 229), referred to on p. 305, "JOURNAL" of March 7.

* In regard to pitch and crude tar prices we would ask readers to refer to the editorial note on p. 396 of the "JOURNAL" for Sept. 10, 1941.

Scotland Nov. 17.

Export business is gradually increasing. Refined tar*: Yield to distillers is 5d. per gallon *ex* Works, naked. Creosote oil: Timber preserving quality,* 5½d. to 6½d.; hydrogenation oil,* 5⅞d.; low gravity or virgin oil,† 7¼d. to 7½d.; benzole absorbing oil,* 6½d. to 8d. per gallon. Refined cresylic acid* is 3s. 6d. to 4s. 6d. per gallon *ex* Works, naked, according to quality. Crude naphtha,† 7d. to 8d. per gallon. Solvent naphtha*: Basic prices delivered in bulk, 90/160 grade, 2s. 10d., and 90/190 Heavy naphtha, Unrectified, 2s. 0½d.: Rectified, 2s. 4d. per gallon. Pyridine†: 90/160 grade, 13s., and 90/140 grade, 15s. per gallon.

* Price controlled. † Uncontrolled.

The turnover in the stock markets last week was more active than in the preceding week. The industrial market was mainly firm with some good features, and under the influence of the Cripps statement Insurance Shares hardened. The South African market was the firmest section throughout the period.

Gas Stocks and Shares had another quiet week and prices generally were held with few changes either way. Oriental Ordinary hardened a further 2 points, and the current price of 202 compares with 147½ at the commencement of the year. Cape Town preference also further improved, and after a long period of depression Commercial Ordinary closed a point higher.

The following is the complete list of changes last week :

SUPPLEMENTARY LIST

Croydon 4 p.c. Pref.	100—105	+2

OFFICIAL LIST

Cape Town 4½ p.c. Cum. Pref. ...	13/—15/–	+1/–
Colombo 7 p.c. Pref. (*x.d.*)	23/6—25/6	Nov. 12
Commercial Ord.	63—68	+1
Gas Consolidation "A" Ord. (*x.d.*)	22/—23/–	Nov. 12
Ditto "B" (*x.d.*)	22/—23/–	"
Ditto 4 p.c. Red. Cum. Pref. (*x.d.*)	18/6—20/6	"
Imperial Continental Ord.	118—121	—
Liverpool Ord.	121—126	—1
Montevideo Ord. (*x.d.*)	109—114	Nov. 12
Oriental Ord.	197—207	+2
South Metropolitan Ord. 6 p.c. Pref.	124—129	—1
United Kingdom Gas Corporation Ord. (*x.d.*)	20/6—21/6	Nov. 12
Ditto 4½ p.c. 1st Cum. Pref. (*x.d.*)...	21/9—22/9	"
Ditto 4 p.c. 1st Red. Cum. Pref. (*x.d.*)	20/—21/–	"
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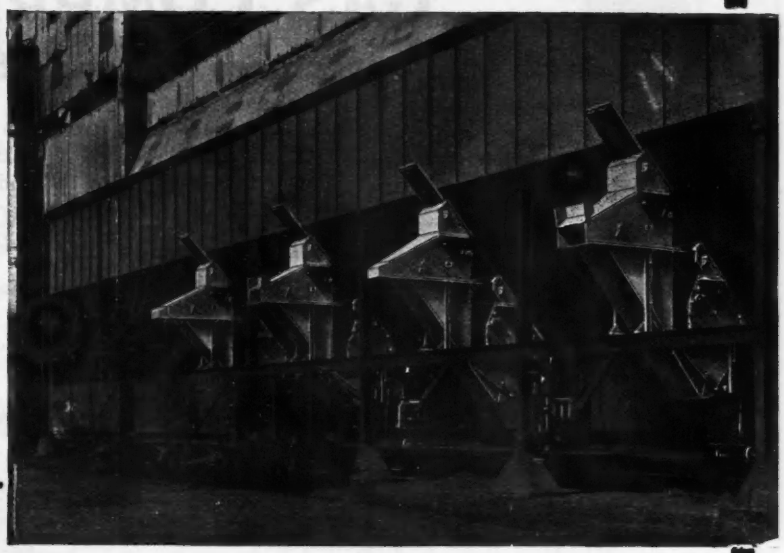

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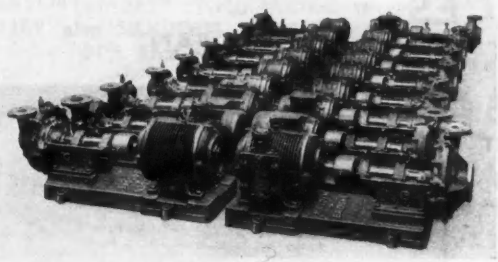
HARLEQUIN AVENUE, GREAT WEST ROAD, BRENTFORD, MIDDX.

CENTRIFUGAL PUMPS



Group of BV Pumps

Many of these sets have been supplied for water circulation and in special metals for dealing with ammoniacal liquor and similar fluids

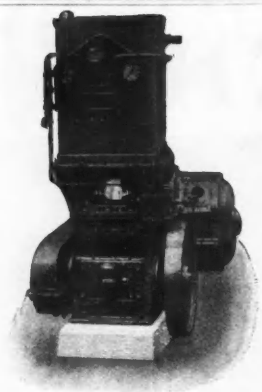
HOLDEN & BROOKE LTD.
SIRIUS WORKS, MANCHESTER 12
AND
66, VICTORIA ST., LONDON, S.W.1

KING ELECTRIC BLOCKS LIFT A LOAD BY FINGER TIP CONTROL

Speaking of pressing a button and getting the work done! Into the air and along it goes—just as easy as that. Three models available: ranging in capacity from 5 cwt. to 10 tons, all built for continuous heavy duty. Overhead runways erected if required.

Write for booklet on Lifting & Shifting

GEO. W. KING LTD HITCHIN · HERTS ·
HITCHIN 960 (10 lines) | MANCHESTER CENTRAL 3947 | NEWCASTLE 24198 | GLASGOW DOUGLAS 2798

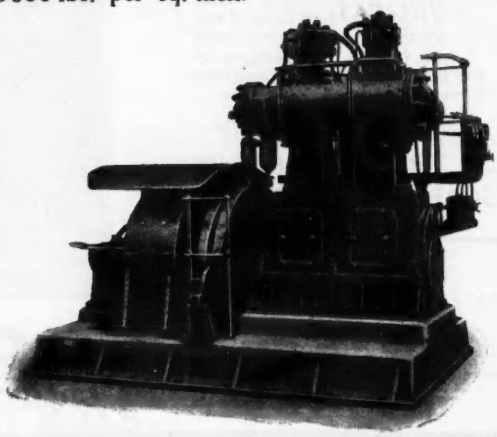


HIGH PRESSURE GAS COMPRESSORS *for*

pressures up to 5,000 lbs. per sq. in.

The illustrations show two high pressure gas compressors which we made recently to order. As specialists in the design and manufacture of compressors for both air and gases, we make compressors for a wide range of capacity and pressure up to 5000 lbs. per sq. inch.

The compressor shown above has a capacity of 25 cu. ft. of free hydrogen per minute compressed to 3000 lbs./sq. inch. The illustration on the right shows a four-stage compressor with a delivered capacity of 200 cu. ft. of free town's gas per minute compressed to 5000 lbs. per sq. inch.



For full information regarding gas compressors, write, giving particulars of the duty required, to—

REAVELL & CO., LTD.

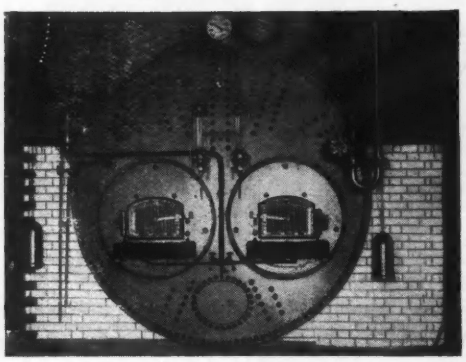
RANELAGH WORKS, IPSWICH

Telegrams: "REAVELL, IPSWICH." Phone Nos. 2124 & 2125

FORCED Wilton **DRAUGHT**

FURNACES

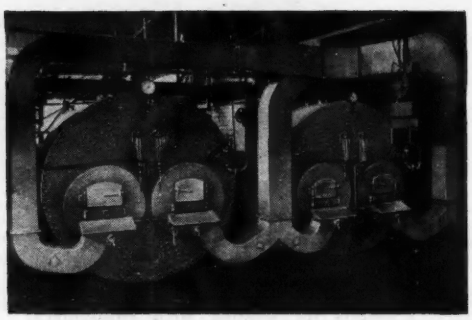
STEAM JET



LOWER INITIAL COST

EXISTING STEAM JET FURNACES CAN BE EASILY CONVERTED TO FAN DRAUGHT

AIR FAN



LOWER WORKING COST

Particulars of Saving on application

THE CHEMICAL ENGINEERING & WILTON'S PATENT FURNACE CO., LTD., HORSHAM, SUSSEX

60% Sulphur absorbed by our

OXIDE

which has stood the test of 60 years.

Minimum Costs, Highest Efficiency

ESTABLISHED 1873

GAS PURIFICATION & CHEMICAL COMPANY LIMITED

PALMERSTON HOUSE, 34, OLD BROAD STREET LONDON, E.C.2.

Telegrams: "Purification, Stock, London." Telephone: London Wall 5077

EDUCATIONAL

ENGINEERING CAREERS AND QUALIFICATIONS

Both Government and Industry announce and emphasize that young men with technical knowledge and qualifications are to have every chance of rising to the highest posts within their capacity in post-war engineering and allied industry.

Write to-day for "The Engineer's Guide to Success"—200 courses—free—which gives the regulations governing qualifications such as A.M.I.Gas E., A.M.I.Chem.E., A.M.Inst.C.E., A.M.I.Mech.E. A.M.I.E.E., C. & G., etc., and contains the widest choice of engineering courses in the world; the Department of Fuel and Chemical Technology covers Gas Supply, Gas Engineering, Gas Power, Chemical Processes, etc. The T.I.G.B. guarantees training until successful and Home-study students of the T.I.G.B. have gained 44 FIRST PLACES in the examinations of the major engineering institutions.

THE TECHNOLOGICAL INSTITUTE OF GREAT BRITAIN

148, TEMPLE BAR HOUSE, LONDON, E.C.4

TROTTER, HAINES & CORBETT LIMITED

FIRE-CLAY & BRICKWORKS STOURBRIDGE

GAS RETORTS In BEST STOURBRIDGE QUALITY also SILICIOUS QUALITY 81% SILICA

HIGH GRADE INSULATING QUALITY FIREBRICKS

REGENERATIVE TUBES & TILES

BOG ORES

IRISH

BELGIAN and DUTCH

HARRISONS (LONDON) LTD.

66, MARK LANE, LONDON, E.C. 3

Telegrams: "BIRCHROCK, LONDON." Telephone: ROYal 3120.

"KLEENOFF"

—THE COOKER CLEANER

Tins for Sale to Consumers. In Bulk for Works Use.

OXIDE OF IRON.

BALE & CHURCH, LTD.

33, ST. MARY AT HILL, LONDON, E.C.3.

Telephone: Mansion House 1156. Telegrams: "Balefire, London."

PLANT &c.

FIRTH BLAKELEY, SONS & CO., LTD. Vulcan Ironworks, Church Fenton, Yorks.

MANUFACTURERS of Gas-holders, Tanks, Condensers, Purifiers, Scrubbers, Washers, and every description of Gas Plant.

Sole Makers of the "P.M" semi-water Gas Plant.

Telegrams: "Blakeleys, Church Fenton."

Telephone: Barkston Ash 234 and 235 (Private Branch Exchange). Code: "Bentleys."

ROBERT DEMPSTER & SONS, LTD., ELLAND, Builders of CARBONIZING PLANTS, both Horizontal and Vertical. Manufacturers of CONDENSERS, PURIFIERS, GAS-HOLDERS, &c., also every description of COAL and COKE HANDLING PLANT. *Telegrams:* "Dempster, Elland." *Telephone:* Elland 2241, 2242 and 2243.

STRACHAN & HENSHAW LTD.

BRISTOL.

MANUFACTURERS and CONTRACTORS for

HANDLING PLANT

SCREENS, TIPPLERS, ETC.

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MEWBURN, ELLIS & CO.,

CHARTERED PATENT AGENTS

AND TRADE MARK AGENTS

70 & 72, Chancery Lane, London, W.C.2.

Telegrams: "Patent, London." 'Phone: Holborn 0437

And 3, St. Nicholas Buildings, Newcastle-on-Tyne.

BROADBENT'S SLAG WOOL

THE WORLD'S FINEST

FIRE-PROOF NON-CONDUCTING material for

GAS PLANT

of every description

J. C. BROADBENT & Co., LTD.

SLAG WOOL WORKS, REDCAR, YORKS. T.N. Redcar 18

54/5, LONDON WALL, LONDON, E.C.2. T.N. City 4618

THE BRITISH GAS PURIFYING MATERIALS CO., LTD.

FOR

NEW AND SPENT OXIDE

LONDON ROAD

Telegrams: "BRIPURIMAT"—LEICESTER—Telephone 59086.

APPOINTMENTS WANTED

APPOINTMENT required as ENGINEER AND GENERAL MANAGER with Gas Undertaking of repute. Fully qualified Engineer, A.M.I.Mech.E. 20 years' managerial experience.

Those interested kindly communicate with No. 9494, "GAS JOURNAL," 11, Bolt Court, Fleet Street, E.C. 4.

APPOINTMENTS VACANT

None of the situations advertised in these columns relates to a man between the ages of 18 and 50 inclusive or a woman between the ages of 18 and 40 inclusive, unless he or she is excepted from the provisions of the Control of Engagement Order, 1945, or the vacancy is for employment excepted from the provisions of that Order.

MECHANICAL PLANT FITTER required on a gas-works in the Home Counties for general repairs to steam engines and turbines, exhausters, pumps, compressors, &c. Applicant should be an experienced machinist. Wages 2s. 2¼d. per hour minimum, or according to ability. Apply, stating Age, Training and Experience to No. 9498, "GAS JOURNAL," 11, Bolt Court, Fleet Street E.C. 4.

BLACKSMITH required for a gas-works in the Home Counties. Wages minimum 2s. 0¼d. per hour according to ability. Apply, stating Age, Training, and Experience to No. 9499, "GAS JOURNAL," 11, Bolt Court, Fleet Street, E.C. 4.

EXHAUSTER ATTENDANT AND BOILERMAN required on a gas-works in the Home Counties. Wages for seven 8-hour shifts, £6 10s. per week, including War Bonus. Apply, stating Age, Training and Experience to No. 9500, "GAS JOURNAL," 11, Bolt Court, Fleet Street, E.C. 4.

MACHINIST required for Isthework, &c., in the machine shop of a gas-works in the Home Counties. Wages minimum 2s. 0¼d. per hour or according to ability. Apply, stating Age, Training and Experience to No. 9501, "GAS JOURNAL," 11, Bolt Court, Fleet Street, E.C. 4.

SPALDING URBAN DISTRICT COUNCIL

(GAS DEPARTMENT)

APPLICATIONS are invited from persons with the appropriate qualifications for the appointment of GAS ENGINEER AND MANAGER at from April 1, 1946.

Applicants should have experience in Works Management and Gas distribution in Urban and Rural Areas. The successful candidate will be responsible for the control and development of the Council's Gas Undertaking, subject to direction by the Gas Committee.

The commencing Salary will be £600 per annum based on a sale of 150 million cubic feet per annum, rising by £25 for each complete increase of 25 million cubic feet per annum to a maximum of £800, plus house and other emoluments valued at £99 per annum and the appropriate Cost of Living Bonus (now £59 16s. per annum). The Engineer is required to provide and maintain a motor car for use in connexion with his duties, for which a travelling allowance of £50 per annum is made.

The appointment will be subject to the provisions of the Local Government Superannuation Acts, and will be determinable by three months' notice on either side. A medical examination will be necessary.

Forms of application can be obtained from me, and must be completed and returned not later than December 5, 1945.

11, Market Place, Spalding, Lincs. RAYMOND W. HASTINGS, Clerk of the Council.

SEVERN VALLEY GAS CORPORATION, LTD.

CHEMIST

APPLICATIONS are invited for the above Position at a Salary of £330 per annum (inclusive of War Bonus).

Applicants must possess recognized Technical qualifications and have received practical Gas-Works training.

Applications, addressed to the undersigned, should be received not later than December 1, 1945, and should be accompanied by *copies* of Testimonials.

Gas-Works, Cheltenham. R. S. SNELLING, General Manager.

(Classified Advertisements continued on p. 736)

APPOINTMENTS VACANT
(continued)

THE DAWLISH GAS AND COKE COMPANY, LTD.
ENGINEER AND MANAGER

APPLICATIONS are invited for the Appointment of ENGINEER AND MANAGER, at a commencing salary of £450 per annum.

Applications, addressed to the Chairman at 10, Park Road, Dawlish, stating Age, Qualifications and Experience, together with information as to position in relation to National Service Acts and Essential Works Order, and accompanied by three recent Testimonials, should be received not later than December 4, 1945.

10, Park Road,
Dawlish.
November 7, 1945.

APPLICATIONS are invited for the Position of WORKS FOREMAN. Preference will be given to applicant with knowledge of Horizontal Retorts and electrically-driven charging machinery. Wages will be paid at the rate of £4 10s. per week, plus War Bonus, now £1 3s., with house, coal and gas free.

Applications, stating Age, Experience and present position in relation to Essential Works Order, enclosing *copies* of recent Testimonials, should be addressed to the undersigned not later than December 1, 1945.

Gas-Works, W. H. REED,
Saltisford, Engineer and Manager.
Warwick.

DRAUGHTSMEN wanted with experience in Structural and Mechanical work as applied to Gas-works Coal and Coke Handling plant. Apply, stating Age, Experience, &c., to W. J. Jenkins & Co., Ltd., Retford, Notts.

This advertisement is inserted with the permission of the Ministry of Labour and National Service.

SOUTH SUBURBAN GAS COMPANY

APPLICATIONS are invited for the Position of ASSISTANT CHEMIST at a Salary (exclusive of War Bonus—approximately £80) of £400.

Gas-works' experience and a science degree are advantageous.

Applications, addressed to the undersigned, should be accompanied by Testimonials, education, training and experience, to be received not later than December 15, 1945.

South Suburban Gas Company, V. SIMMONDS,
Lower Sydenham, Engineer.
S.E. 26.

NAIRN GASLIGHT COMPANY, LTD.
ENGINEER AND MANAGER

APPLICATIONS are invited for the position of ENGINEER AND MANAGER of the above Company at a Salary of £450 per annum.

The annual output of the works is approximately 50 million cubic feet, and the carbonizing plant consists of Horizontal Retorts and a Simplex Water Gas Plant.

Candidates must have practical experience of similar plant and experience of Distribution and Gas-Works Administration.

Applications, stating Age, Experience and Qualifications, should be addressed to the undersigned, and received not later than Wednesday, December 5, 1945.

Nairn Gaslight Company, Ltd., THE SECRETARY.
High Street, Nairn.

COMPETENT CHEMIST required for Coal Testing in Gas-Works Laboratory. Preference given to person having had similar experience. Good prospects of advancement. Salary £350 per annum, inclusive. Applicants should submit full details of training and experience to Severn Valley Gas Corporation, Ltd., Gas-Works, Cheltenham.

TECHNICAL ASSISTANTS

APPLICATIONS are invited to fill two vacancies on the Service/Sales Staff of a Firm of Contractors to the Gas and allied Industries. Applicants must have good knowledge of Carbonizing and Mechanical Handling, and experience in plant installation and maintenance would be an advantage.

Salary according to Age, Experience and Professional Qualifications.

Apply to No. 9502, "GAS JOURNAL," 11, Bolt Court, Fleet Street, E.C. 4.

OXFORD GAS COMPANY
ASSISTANT WORKS ENGINEER

APPLICATIONS are invited for the Position of ASSISTANT WORKS ENGINEER to the above Company at a commencing salary of £550 per annum, including War Bonus.

Applicants must be fully qualified Engineers with previous experience of modern Gas Manufacture, preferably in Horizontal Retorts and Carburetted Water Gas Plants, and be capable of preparing drawings and specifications for all Gas-works Plant.

The successful candidate will be required to become a contributing member of the Company's Superannuation Fund.

Applications, giving full details of Age, Training, Qualifications and Experience, should be enclosed with *copies* of two recent Testimonials and addressed to the undersigned.

Closing date for receipt of applications, December 12, 1945.

Therm House, ALEXANDER TRAN,
St. Aldates. General Manager and
Oxford. Chief Engineer.

THE CROYDON GAS COMPANY
ASSISTANT SECRETARY

APPLICATIONS are invited from fully qualified secretaries and accountants, aged 30/35 years, for the post of ASSISTANT SECRETARY.

Knowledge of The Companies Clauses Acts, general secretarial duties, accounting, taxation and rating of public utility Companies is essential, and a knowledge of the law relating to gas is also desirable.

The commencing Salary will be £750 per annum, including war bonus.

The successful candidate, who will be required to pass a medical examination, will be admitted to the Company's Co-partnership Scheme and contributory Pension, Widows' and Orphans' Fund.

Applications, marked "Assistant Secretary," giving details of Education, Professional Training and Experience and the names of two persons to whom requests for Testimonials may be made, should be received at the offices of the Company not later than December 11, 1945.

W. H. HADDLETON,
Secretary.

PLANT &c. FOR SALE & WANTED

'PHONE 98 STAINES.

FOR SALE.—24 ft. by 9 ft. and 17 ft. by 6 ft. Cylindrical Tanks; Thompson Lancashire Boiler 24 ft. by 7 ft., 120 lb.; 34 kw. Browett 220 volt Steam Generating Set; Weir Feed Pump 8½ in. by 6 in. by 18 in.; Tangye 3-Throw Hydraulic Pump 3½ in. by 6 in.; Receiver 30 ft. by 7 ft. dia., dish ends ½ in. plate.

HARRY H. GARDAM & CO., LTD., STAINES.

GAS Meter Making and Repairing Concern with freehold premises in the Midlands and good pre-war record, now capable of appreciable expansion, is for disposal.

Address No. 9503, "GAS JOURNAL," 11, Bolt Court, Fleet Street, E.C. 4.

FOR DISPOSAL.—A quantity of surplus gas-works plant, including steam engines, gas engines, electric motors, compressors, governors, retort mouthpieces, washers and scrubbers, &c., also cast-iron pipe specials. List on application to Severn Valley Gas Corporation, Ltd., Gas-Works, Cheltenham.

THE TORQUAY AND PAIGNTON GAS COMPANY
FOR SALE

CAST IRON PURIFIERS, NOMINAL CAPACITY
1,400,000 CU.FT. PER DAY

FOR sale on site at Hollacombe Gas-Works, one set of dry lute PURIFIERS, comprising four boxes each 35 ft. by 20 ft. by 5 ft. deep, and two catch boxes each 17 ft. 6 in. by 20 ft. by 5 ft. deep, complete with travelling cover hoist, 20 in. disc type side valves and connexions and oxide elevator driven by gas engine, all in good condition. Inspection by appointment. The General Manager, 112, Union Street, Torquay.

BUSINESS OPPORTUNITIES

POST WAR DEVELOPMENTS.—Manufacturers interested in the production of a new type of small high capacity dry gas meter giving 100% increase in output over existing types, fully protected by patents and easily manufactured by firms formerly engaged in War Production, are invited to communicate with the undersigned Solicitors and Agents for the Patentee.—Rayner & Wade, Solicitors, 34, Castle Street, Liverpool, 2.

COMPANY NOTICES

THE GAS LIGHT AND COKE COMPANY
3% CONSOLIDATED DEBENTURE STOCK
4½% REDEEMABLE DEBENTURE STOCK
5% REDEEMABLE DEBENTURE STOCK

NOTICE IS HEREBY GIVEN that the TRANSFER BOOKS of this Company, so far as they relate to the above-mentioned DEBENTURE STOCKS, WILL BE CLOSED at 12.30 p.m. on the 1st December, 1945, for the half-year ending on the 31st December, 1945, and WILL BE REOPENED on the morning of the 3rd December, 1945.

Chief Office: By Order,
30, Kensington Church Street, BRIAN WOOD,
W. 8. Secretary.
November 14, 1945.

CONTRACTS OPEN

CITY OF MANCHESTER

THE Gas Committee invites Tenders for the work and materials required in the provision and erection of a SINGLE-LIFT SPIRAL-GUIDED GASHOLDER with Steel Tank, at the Partington Gas-Works.

Specification and form of Tender may be obtained on application to Mr. J. H. Cadman, Commercial Manager and Secretary, Gas Department, Town Hall, Manchester, 2.

Sealed Tenders in the envelope provided, addressed to the Chairman of the Gas Committee and endorsed "C.W.G. Gasholder, Partington," must be delivered at the Gas Office, Town Hall, Manchester, 2, not later than 5 p.m. on Friday, January 4, 1946.

The Committee does not bind itself to accept the lowest or any Tender.

Town Hall, PHILIP B. DINGLE,
Manchester, 2. Town Clerk.
November, 1945.

CITY OF MANCHESTER

THE Gas Committee invites Tenders for the work and materials required in the provision and erection of a CARBURETTED WATER GAS PLANT at the Partington Gas-Works.

Specification and form of Tender may be obtained on application to Mr. J. H. Cadman, Commercial Manager and Secretary, Gas Department, Town Hall, Manchester, 2.

Sealed Tenders in the envelope provided, addressed to the Chairman of the Gas Committee and endorsed "C.W.G. Plant, Partington," must be delivered at the Gas Office, Town Hall, Manchester, 2, not later than 5 p.m. on Friday, January 4, 1946.

The Committee does not bind itself to accept the lowest or any Tender.

Town Hall, PHILIP B. DINGLE,
Manchester, 2. Town Clerk.
November, 1945.

CLASSIFIED ADVERTISEMENTS

Situations Wanted (prepaid), six lines and under (about 36 words), 4/6 per insertion. Each additional line (about six words), 9d.

Situations Vacant, Plant Wanted and for Sale, Contracts, Notices, &c., 1/- per line, with a minimum of 5/-. Box number charge, 6d.

To ensure insertion, copy for Classified Advertisements should be received on the Friday preceding publication date.

GAS DRYING PLANTS by HOLMES

FOUNDED 1850 HUDDERSFIELD

Prevent Corrosion of Gas Mains, Services and Meters

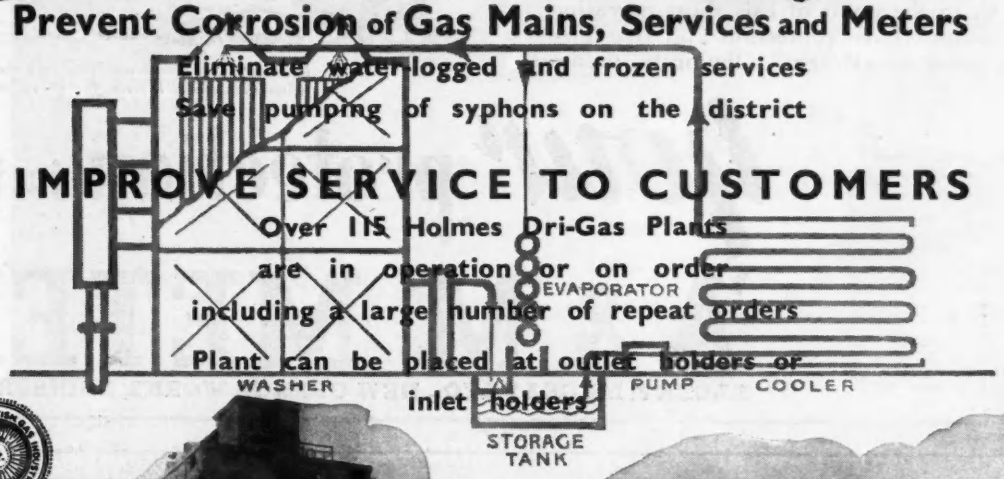
Eliminate water-logged and frozen services

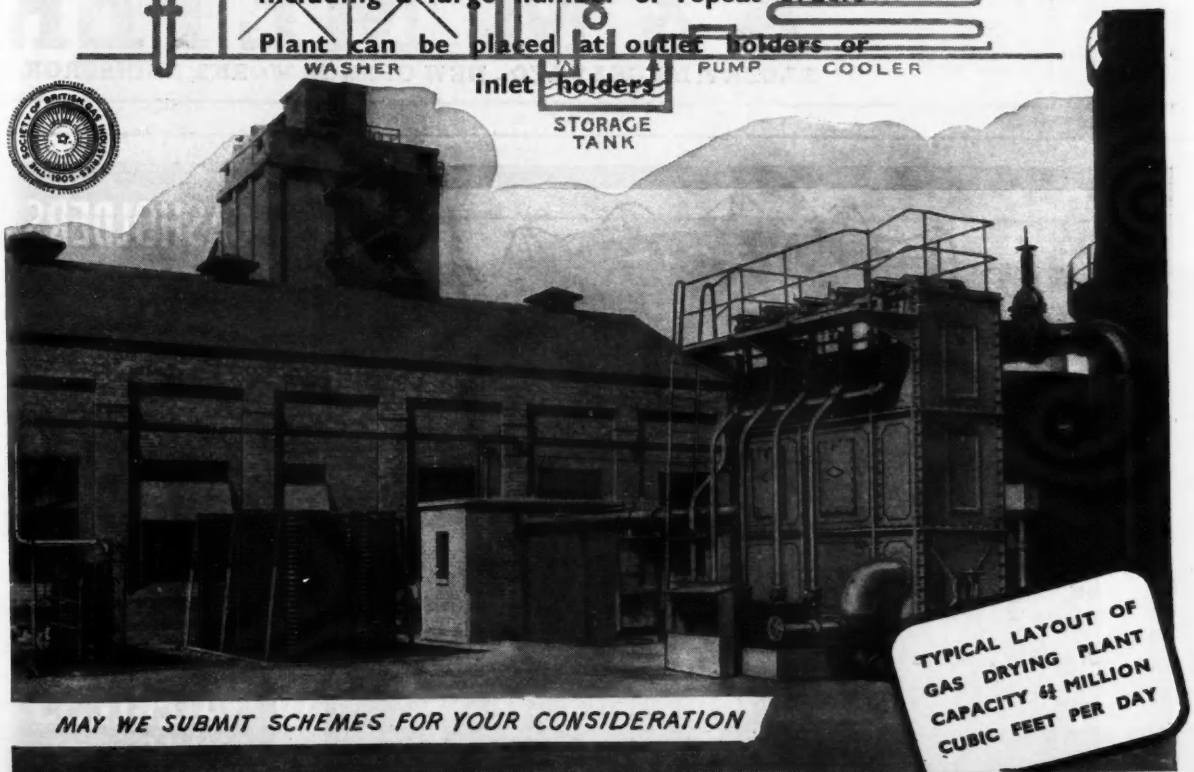
Save pumping of syphons on the district

IMPROVE SERVICE TO CUSTOMERS

Over 115 Holmes Dri-Gas Plants are in operation or on order including a large number of repeat orders

Plant can be placed at outlet holders or inlet holders





TYPICAL LAYOUT OF GAS DRYING PLANT CAPACITY 4½ MILLION CUBIC FEET PER DAY

MAY WE SUBMIT SCHEMES FOR YOUR CONSIDERATION

HEAD OFFICE • TURNBRIDGE • HUDDERSFIELD

LONDON OFFICE · 119 VICTORIA ST. S.W.1 · MIDLANDS OFFICE 21, BENNETT'S HILL BIRMINGHAM 2

Telephones: Huddersfield, 5280 · LONDON, Victoria, 9971 · BIRMINGHAM, Midland, 6830

C 246

Protection—

The Hermit Crab is literally "a poor fish," and for all we know, he may be responsible for the coining of that well-known phrase. Apparently he has neither brains nor—to put it vulgarly—guts! Else how could he be content with somebody's discarded abode as his lodging? Nevertheless, this "discarded" abode becomes his only protection (and a very efficient one) against the rigours of the elements and against his natural enemies. And this brings us to the point of this short narration . . . you must have protection and that protection must be efficient. Obviously, then—

HERMIT CRAB. A variety of crab that lives in mollusc's cast-off shell to protect its shell-less hinder parts.

your protection is the

'A & M' METER

ALDER & MACKAY LTD., NEW GRANGE WORKS, EDINBURGH, 11

GASHOLDERS AND TANKS OF ANY SIZE AND DESIGN

FRAME GUIDED SPIRAL WATERLESS (MAN PATENTS)

LONDON OFFICE: ABBEY HOUSE · 2 VICTORIA ST. S.W.1.

PURIFIERS, STRUCTURAL STEELWORK, WELDED AND RIVETTED. STEEL PIPES, TAR DEHYDRATION, AND DISTILLATION PLANTS, BOILERS.

CLAYTON SON & CO., LTD., Moor End, Hunslet, LEEDS

GEORGE GLOVER'S TWO-V-COIN

SMALL HIGH-CAPACITY PRE-PAYMENT METERS

Dependable Year-in Year-out

Ranelagh Works CHELSEA 122, King's Road S.W.3

YES A POWERFUL ROBUST SELF-SUSTAINING WINCH

Smallest wall space, side or front driving also special types, including multi division barrels, combined horizontal and vertical operation, etc.

Used Largely for Black-out Shutter Operation

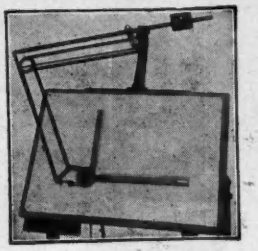
WINCHES

Also used for Blinds, Electric Lighting Fittings in Halls, Hotels, etc. Dampers, Curtains, Laundries, Steamer Lids, Hospitals, Street Lighting, A.R.P. Clothes Racks, Hoses, etc.

LONDON ELECTRIC FIRM, CROYDON
UPLANDS 4871/2

NO RATCHETS, PAWLS, SPRINGS or GEAR WHEELS

"MAVITTA" DRAFTING MACHINES



MACHINES FOR ALL BOARDS

PERFECTLY BALANCED TABLES

ENTIRELY BRITISH

THE MAVITTA DRAFTING MACHINES LTD.
ANCHOR WORKS, PARK ROAD, BIRMINGHAM, 6
Telephone: EAST 0482. Telegrams: MAVITTA, BIRMINGHAM

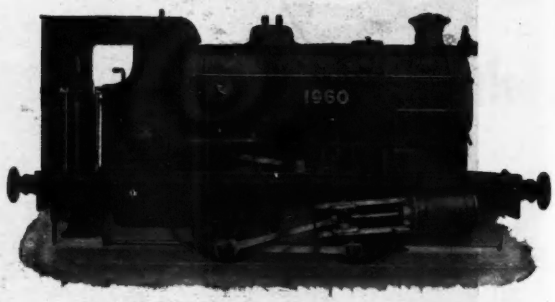
LOCOMOTIVES

LOCOMOTIVES of all Sizes and Gauges specially constructed for Main and Branch Lines, Contractors, Docks, Gas-Works, Collieries, Iron-Works, Brick and Cement Works, &c. Locomotives of various sizes always in progress for early delivery.

Photographs, Specifications, and prices on Application

PECKETT & SONS, Atlas Locomotive Works, **LTD., BRISTOL.**

Telegraphic Address: "PECKETT BRISTOL."
London Representatives: FERGUSON & PALMER, 9, Victoria St., Westminster, S.W.1



Meter and Governor Leathers

DIAPHRAGM'S DEPENDABLE DIAPHRAGMS

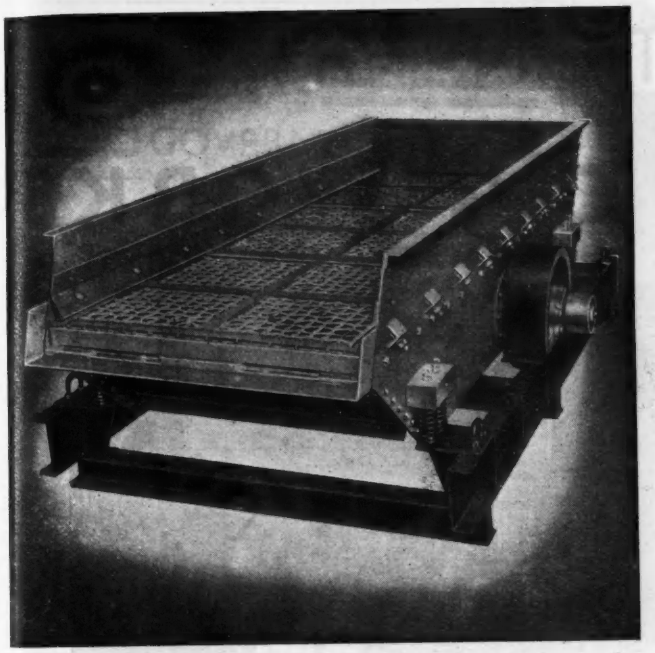
have been supplied to all parts of the World since 1847

Cutting-Out Shop where the best part of the skins are cut up by highly skilled men.

Products of the "All-Gas-Powered" Works

The Diaphragm & General Leather Co., Ltd.

Franklin Road Works, PORTSLADE, SUSSEX



NIAGARA

The capacity of Niagaras installed in the coal trades exceeds forty million tons a year. This record has induced many people to grade with Niagaras to their greater profit.

NIAGARA SCREENS (Gt. Britain) Ltd.
Straysfield Road, Clay Hill, Enfield, Middlesex

A

MAKE A DATE WITH VULCAN

The date is not too far distant when you will see the new VULCAN stoves. VULCANS that embody the latest ideas of what kitchen equipment should be. Discerning customers will certainly want VULCAN stoves to grace their modern kitchens.

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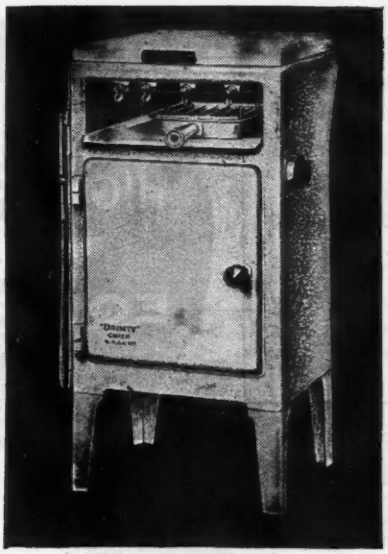

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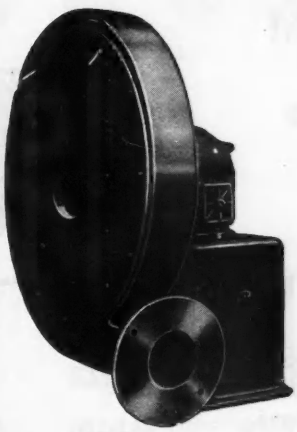

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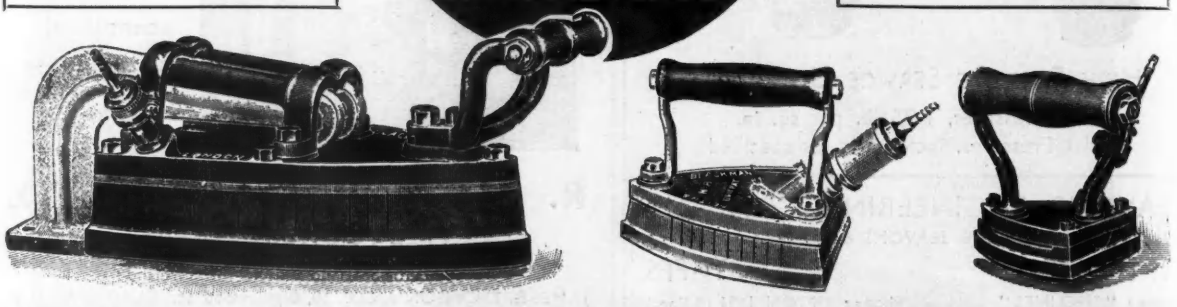

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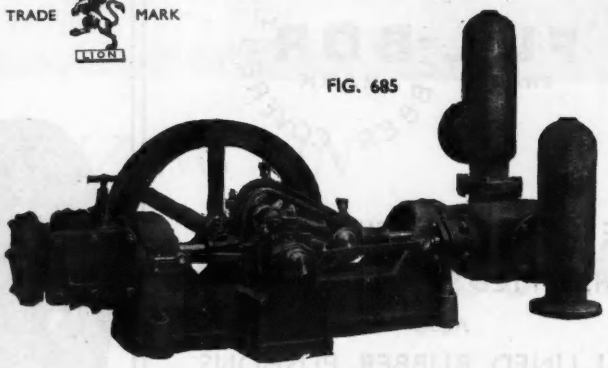

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